# Heartwarming Closeness

## *Being Moved Induces Communal Sharing And Increases Feelings of Warmth*

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Abstract

The feeling of being moved has only received marginal attention by emotion research during the last decades. Recently, an emotion framework termed *kama muta* has been introduced giving a first overview and suggesting that being moved is a positive cultural-dependent feeling typically accompanied by tears, piloerection, and a warm feeling in the chest (Seibt, Schubert, Zickfeld & Fiske, 2015). The present article tries to give a first insight into the effects of kama muta. Based on relational models theory (Fiske, 2004) it is postulate that being moved induces closeness and feelings of warmth. Two different studies including 702 participants investigated the effects of being moved with regard to a known or unknown observed target. Over both studies communal feelings toward the target were predicted by being moved, and in Study 2 also by the type of story presented (moving vs. neutral vs. amusing). In both studies, subjective feelings of warmth in the chest were higher after feeling moved. The interplay among being moved, warmth in the chest and communal feelings was mediated by both warmth and communal feelings in Study 2. Implications of the present findings and possible future research directions are discussed.
*Keywords:* being moved; kama muta; closeness; warmth; relational models

Summary

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Does feeling moved or touched comprise a particular affective state that is distinguishable from other emotions? Recently, the phenomenon has received some more attention from different perspectives. One perspective argues that being moved is elicited by a sudden intensification in communal relations (Seibt, Schubert, Zickfeld & Fiske, 2015). Based on Relational Models Theory (RMT, Fiske, 2004) the *kama muta* framework posits that being moved is a culturally dependent positive affective state that often includes tears, goosebumps or chills and informs the experiencing, engaging, reinforcement and building of communal sharing relationships. The proposition that being moved triggers communal feelings has not been tested empirically yet. Therefore, the present thesis gives a first insight into this mechanism by hypothesizing that being moved induces feelings of closeness and warmth. In an exploratory fashion it is hypothesized that either closeness or warmth feelings function as a mediator on the interplay among being moved, closeness and warmth.

Study 1 investigated the effects of 1$^{st}$ or 2$^{nd}$ person experiences of kama muta. These experiences arise when individuals are actively involved and increase either a communal sharing relation with another individual or feel an increase of a communal sharing relation by another person. U.S. American participants were either instructed to think of a moving, amusing or neutral experience they shared with their mother and were then asked to indicate their communal feelings towards this target and another family member, as well as, warm feelings in the chest.

Study 2 extended the first research experiment and investigated the effects of 3$^{rd}$ person experiences. Third person perspectives are defined as observing two or more targets increasing their communal relations without being actively involved. U.S. American participants listened to either a moving, amusing or neutral story narrated by an unknown individual and completed the same measures as in the first study.

Results indicated that communal feelings were positively predicted by feelings of being moved and also differed from an amusing or neutral state in Study 2. Moreover, in both studies feelings of warmth in the chest were experienced more after feeling moved than after feeling amused or in a neutral state. Finally, the relationship among being moved, warmth and closeness was mediated by both feelings of warmth and closeness in Study 2.

The present thesis was part of the kama muta project and the author collected the data independently.

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# Being Moved Induces Communal Sharing And Increases Feelings of Warmth

> Oh, forgive me! Forgive me! Yesterday! It should have been the final moment of my life. O you angel! For the first time, for the first time the feeling of bliss glowed freed from doubt through my innermost being: She loves me! She loves me! Still burning on my lips is the divine fire that streamed from yours; there is a new warm bliss in my heart. Forgive me! Forgive me!
>
> – Johann Wolfgang von Goethe, *The Sorrows of Young Werther*

Everyday people consume media content such as videos, pictures or narratives on the Internet. A significant proportion of these stories or short video segments contain themes showing individuals reuniting after a long separation, acting altruistically or overcoming obstacles. These contents are in turn shared on social media sites and people want to re-experience the attributed feeling with close and significant others. Moreover, individuals in different cultures report similar feelings when engaging in real-life reunions or being overwhelmed by unexpected acts of kindness or love. This particular feeling is consistently labeled as *moving*, *touching* or *heartwarming,* and in addition physiological reactions such as moist eyes, tearing up, piloerection or a warm feeling in the chest are reported at times (Seibt, Schubert, Zickfeld & Fiske, 2015). However, few attempts have been made to conceptualize the phenomenon of *being touched* or *moved* (for an exception see Cova & Deonna, 2014; Haidt, 2003). There is likewise little empirical work on the feeling, its antecedents or effects. The states and motivations triggered by being moved generally have been neglected.

Recently an emotion framework termed *kama muta* (Sanskrit for *moved by love*) was introduced (Seibt et al., 2015). The authors suggest that kama muta is a pro-social and positive affective experience. If intense enough, the feeling is typically accompanied by tears, chills or perceptions of subjective feelings of warmth in the chest. Moreover, it is argued to be culturally dependent. Vernacular terms in different languages, such as *being moved* in English or *blir rørt* in Norwegian, represent a specific implementation. According to the authors, kama muta is triggered by sudden intensifications of communal relationships—a concept from Relational Models Theory (RMT, Fiske, 2004). In turn kama muta is suggested to result in building, reinforcing and engaging in these communal relations. This perspective would suggest that feeling moved evokes communal sharing, which is in line with the more general assumption that positive social emotions mostly indicate social relational opportunities (Fiske, 2010). Moreover, a bulk of literature suggests that positive affective states in general *broaden* the scope of engaging in social relations (Fredrickson, 2013). Communal relations have also been linked to heightened warmth perceptions and vice versa (e.g. IJzerman & Semin, 2010;

Williams & Bargh, 2008), whilst feelings of kama muta are often accompanied by a feeling of warmth in the chest (Seibt et al., 2015).

The present article presents two empirical studies investigating the outcomes of kama muta and its relation to closeness and subjective warmth perceptions. Based on relational models theory it is argued that kama muta induces communal sharing motivations and subjective feelings of warmth. In turn the relationship among being moved, closeness and warmth is thought to be mediated by either warmth perceptions or communal feelings.

## Being Moved

Imagine two lovers who have been sharing extraordinary intimacy for some parts of their lives and who have been working together as artists. One day they decide that both need to move on with their lives separately. In order to symbolize this process they share one last moment of intimacy and then depart in two different directions. About thirty years later one of these individuals hosts an exhibition in which she sits emotionless and motionless at a table where strangers can join her and share a moment. One day she is suddenly approached by a familiar face during her exhibition. It is her former lover whom she has last seen some decades ago. He sits down in front of her and smiles with a familiar expression. The artist is overwhelmed by her feelings and slowly begins to cry. She cannot control her feelings and eventually touches the hands of her former companion. Upon this action the audience beings to cheer and applaud. While reading this story one might actually experience the same affective states as the protagonists, although probably less intense. In fact, participants in an experiment by Seibt and colleagues (2015) did watch a video including a similar story about the Serbian performance artist Marina Abramović and her old intimate partner Ulay. Participants reported being *moved* or *touched* and also tears, amongst other physiological markers. Although largely neglected in emotion research during the last decades, different frameworks have emerged throughout the last years that try to conceptualize this phenomenon. In addition to the kama muta framework other models of being moved are presented and discussed.

### Contemporary Models of Being Moved

One conceptualization of feelings of being moved or touched includes the *elevation* framework (Haidt, 2003; Keltner & Haidt, 2003). According to this perspective the affective state of elevation is caused by *observing* great acts of moral beauty, uncommon goodness, or behaviors high in purity (Algoe & Haidt, 2009). Notably, Haidt does not only indicate that elevation is often denoted by the vernacular terms of being moved or touched, but in addition

most empirical work on elevation measures and operationalizes the concept elevation with items on being moved, being touched and warm feelings (see Silvers & Haidt, 2008; Schnall, Roper & Fessler, 2010; Oliver et al., 2015). In fact, recent research suggests that elevation is *de facto* the same as the concept of being moved (Cova, Deonna & Sander, 2014).

Cova and Deonna (2014) provide a philosophical analysis of the vernacular terms *moved* and its French cognate *ému*. They introduce the concept of being moved as a genuine emotion that arises when positive values become powerful and salient. According to the authors this could be achieved by a sudden and surprising manifestation of positive values or for example due to a transition from negative to positive values, thereby signifying a contrast and increasing the salience of the positive value (cf. Wildschut, Sedikides, Arndt & Routledge, 2006 on *nostalgia*). In turn positive core values are thought to generate action tendencies and emphasize the importance of the positive value. Feeling moved by a movie in which the protagonist reunites with her mother could for example strengthen and reorder the tendency to feel communal to one's own mother, thereby acting upon one's family values. Finally, Cova and Deonna argue similarly to the kama muta model that being moved has a positive valence and often includes physiological markers such as tears, a lump in the throat, chills or warm feelings in the chest.

Some researchers have focused on being moved as a response to aesthetic experiences. Konečni (2005; 2011) proposed that being moved is a part of the *aesthetic trinity* along with including aesthetic awe and thrills. Another study has investigated the so-called *sad-film paradox*, the relation between sad films and positive enjoyment (Hanich, Wagner, Shah, Jacobsen & Menninghaus, 2014). Testing the paradox in a natural movie theater atmosphere, the authors conclude that feelings of being moved mediate the link between sadness and enjoyment. The same research group also developed a psychologically grounded concept of being moved (Menninghaus et al., 2015). Based on linguistic and appraisal analyses the authors conclude that being moved is a mixture of sadness and happiness, though positive in valence, and is often triggered by significant life events and appraising compatibility of one's own ideals or norms. It is also argued to include tears and chills (Wassilliwizky, Wagner, Jacobsen & Menninghaus, 2015) and function as a bonding and approaching mechanism.

**Kama Muta**

The question arises why a theoretically grounded model is needed when one could just use the vernacular terms such as *being moved*. Seibt and colleagues (2015) argue that the introduction of an umbrella term such as kama muta is vital in order to highlight cultural

differences in utilization and implementation. While the English vernacular *being moved* and the Norwegian *blir rørt* undoubtedly share some important characteristics in meaning they might at times not overlap completely. An English native might characterize something as *moving* that would not be characterized as *rørt* by a Norwegian and vice versa. Kama muta is therefore thought as an underlying disposition of culturally-informed affective states that are characterized by a sudden intensification of CS, whereas *moved*, *rørt*, *gerührt* or *ému* represent the cultural specific terms of this combination. Throughout this article the terms will therefore be utilized accordingly.

The construct of kama muta is based on relational models theory (Fiske, 1992, 2004). Relational models theory posits that all social relations are organized by four different elementary and universal relational models; communal sharing (CS), authority ranking (AR), equality matching (EM) and market pricing (MP). These models are dependent on cultural, temporal, developmental and individual factors. In order for individuals to generate and regulate relations or communicate them, the abstract structure (*mod*) needs to interact with a socially transmitted prototype or template (*preo*). Hence, all models are influenced by both evolved templates and specific cultural implementations.

CS is particularly important for the kama muta model. Communal sharing supposes that individuals are united by a common underlying essence such as descent and give and share according to the other's needs. Prototypically these relations encompass close significant relations or kinship. However, they can extend to more diffuse social group identities. Examples for CS relations include individuals intensely in love or people that are united by some common essence such as nationality. Conformations of CS include what Fiske (2004) terms *consubstantial assimilation*, which includes inter alia touch, synchrony, imitation, sharing of body essences, commensalism and transmitting bodily warmth. Communal sharing is similar to the concept of *communal relationships* (Clark & Mills, 2011; 1979), which emphasizes fulfilling the needs of another person without awaiting something in return. In addition, the inclusion of the other in the self concept (Aron & Aron, 1996; Aron, Aron & Smollan, 1992) shares characteristics with the underlying common essence of CS relationships.

According to Seibt and colleagues (2015) kama muta is evoked by sudden intensifications of communal sharing relationships. Moreover, kama muta is conceptualized as a positive culturally-dependent affective state that if intense enough includes physiological reactions such as tears, moist eyes, piloerection, chills and a warm feeling in the chest.

Sometimes the feeling can include several of these physical markers simultaneously whilst they can also occur in isolation at other times. In turn kama muta is argued to motivate the engagement, reinforcement and initiation of communal sharing relations.

In contrast to the elevation concept, kama muta is thought not only caused by observing, but is argued to occur in 1st, 2nd and 3rd person perspectives. These are important analytic distinctions, but the dynamics are such that all three may occur simultaneously. A 1st person kama muta feeling is defined as emerging from oneself suddenly intensifying a CS relation with another target or several targets. Expressing intense love to another person would trigger a 1st person experience in oneself and possibly 2nd person kama muta in the recipient as 2nd person is defined as emerging from another target suddenly intensifying a CS relation towards oneself. A second person's act of great kindness, generosity, or self-sacrifice for a person X could evoke 2nd person kama muta in X. Finally, 3rd person kama muta would arise when observing two or more targets engaging in the sudden intensification of CS relations. Two unpublished diary studies provide first evidence for this proposal (Seibt, Schubert, Zickfeld & Fiske, 2014). Over a 2-week period participants reported their feelings of being moved or touched, which were then coded as 1st, 2nd and 3rd person experiences. Although 3rd person experiences were reported most frequently, 1st and 2nd person kama muta were also often experienced.

Various empirical findings support the notion that kama muta is connected to communal sharing relations (Seibt et al., 2015). In one study Norwegian and U.S. participants had to name two specific individuals they interacted with on a regular basis. Afterwards they completed the models of relationships questionnaire (MORQ, Haslam & Fiske, 1999) assessing the four different relational models, and provided information on which emotions they regularly experience with the target. Both feeling moved or touched were best predicted by a CS relationship across the two sample populations.

In another two studies in the same article by Seibt and colleagues (2015) participants watched different moving videos and were asked to indicate different appraisal patterns. Both studies were conceptually similar and differed only in their sample and stimulus selection. Results for both studies indicate that reported feelings of kama muta were predicted by increased closeness across the stimuli characters, as well as increased perception of humanness and morality. All these three appraisals can be conceived as being part of CS (Seibt et al., 2015). Similar findings have been found in a cross-cultural comparison utilizing the same paradigm including samples from Portugal, Israel and China (Schubert et al.,

2015a). These video studies asked participants to indicate judgments after watching a short clip.

This procedure was extended in a different experiment (Schubert, Zickfeld & Seibt, 2015b) in which participants reported their feelings and evaluations continuously while watching six different moving video segments. Sampling feelings of being moved or touched, happiness, sadness and closeness evaluations, as well as different physiological symptoms, the study included over 900 participants. The main results suggest that being moved or touched and judgments of closeness among the characters in the video follow the same time course. This study also gives a first insight that the onset of being moved correlates with a sudden increase in closeness evaluations.

However, all of these findings are based on correlational evidence and a causal relationship has not been empirically established yet. Both studies by Schubert and colleagues (2015b), as well as Seibt et al. (2015) utilized only stimuli that they deemed moving. These studies did not include another positive or a neutral state as control.

In sum, the kama muta model differs mostly from Haidt's (2003) concept of elevation and Cova and Deonna's (2014) conceptualization of being moved with regard to how the affective state is assumed to be caused or triggered. While elevation and the concept of core values focus on the perception of other individuals, kama muta emphasizes the appraisal of social relations. Menninghaus and colleagues (2015) argue that being moved includes little if any control, which differs from the view of the kama muta model that the feeling might result from one's own (1$^{st}$ person) initiative. In addition, the concept of elevation is also thought to be mainly observed and be experienced from a 3$^{rd}$ person perspective. On the other hand there is mutual agreement on the affective qualia, including physiological reactions, and partial consensus on the effects of being moved.

**Kama Muta & Closeness**

The terms *closeness* and *social proximity* are often utilized interchangeably (e.g., IJzerman & Semin, 2010). Throughout this article closeness and social proximity are defined as a communal sharing feeling or experience. This definition refers to the state of experiencing or feeling an overlap with another individual (Aron et al., 1992) or identify with the communal needs of another person (Mills et al., 2004). In fact, research supports this view and indicates that participants' ratings of *closeness* are tightly associated with communal sharing (Seibt et al., 2015).

As reported earlier, in the same study by Seibt and colleagues (2015) closeness was also found to be positively correlated with feelings of being moved and touched. Another experiment provides further evidence for this link (Oliver et al., 2015). In this study participants watching a moving video reported more connectedness towards other groups than individuals watching an amusing or neutral clip. Although this study was based on the concept of elevation, affective states were measured with self-ratings of *being moved* or *being touched*. In two additional studies in the article by Seibt and colleagues (2015) reported earlier, Norwegian and U.S. American citizens watched in total 19 videos and read one comic that the authors identified as possibly moving. Results indicated that feelings of being moved or touched were not only predicted by elevated judged closeness of the observed characters, but also by increased feelings of closeness towards the characters. These two studies provide the first evidence that kama muta might actually induce closeness and increased feelings of closeness. However, it should be noted that, except for Oliver and colleagues' study, all videos included in both studies by Seibt et al. were selected to cause feelings of being moved and touched and there was no control video inducing another affective state. It is therefore possible that in general all positive emotions result in more closeness and communal sharing tendencies due to their positivity (cf. Fredrickson, 2013; Fredrickson, 2001; Mauss et al., 2011).

In fact, the *broaden-and-built theory* of positive emotions would predict that positive emotions increase closeness and the tendency to engage in social relations (see Fredrickson, 2013; 2001, for a comprehensive overview). According to this proposition positive emotions first *broaden* one's general focus of awareness, attention and also social perception. This broadening later leads to the *building* of resources and skills (which Fredrickson calls an *upward spiral*). Empirical evidence suggests that positive emotions broaden and form inclusive social categories (Isen, Niedenthal & Cantor, 1992) and reduce in-group biases such as the own-race bias (Johnson & Fredrickson, 2005). The building part also links positive emotions to increased social connectedness and proximity (Mauss et al., 2011; Reis & Patrick, 1996).

In a longitudinal study Mauss and colleagues investigated the effects of positive emotion dissociation on psychological functioning and well-being. Emotion dissociation refers to the tendency that actual behavior does not reflect the underlying feeling, for example smiling whilst experiencing sadness. Although this study was not interested in a relationship between closeness and positive emotions per se, social connectedness was assessed. Increased

behavior-emotion association was found to increase social connectedness. However, evidence from this study is only correlational and included only positive emotions and no neutral or negative affective states. Moreover, there is little experimental research that investigates whether all positive emotions induce closeness, or just peculiar ones and whether this mechanism is attributed to positive valence or some other aspects. In the list of positive emotions Fredrickson (2013) does not include being touched or moved. The state that might resemble kama muta most is the emotion of *love*, which is emphasized as a core for closeness. Kama muta does definitely share many characteristics with Fredrickson's ten positive emotions but it seems that it represents a concept of its own not captured by any of the other emotions. Future work would need to establish this differentiation.

It should be noted that both studies by Seibt and colleagues (2015) asked to report closeness towards one or more observed (fictional) individuals that were involved in or causing the elicitation process of being moved. It remains open to discussion whether communal sharing can *generalize* to other targets uninvolved in the elicitation process and whether this operates on a concrete individual or more abstract group level. Imagine feeling moved by an extraordinarily altruistic action by your partner. Would this translate not only to feel closer to your partner but also to another uninvolved individual such as a close friend? Oliver and colleagues (2015) provide evidence that participants feeling moved reported higher overlap and closeness towards humanity in contrast to participants induced with general positive affect. Hence, this study provides first evidence that a generalization effect might occur on a more abstract or global level. However, it still needs to be investigated whether this effect holds true at the concrete individual level.

**Kama Muta & Warmth**

Communal sharing, the basis of kama muta, is associated with warmth and tied to social thermoregulation (IJzerman et al., 2015). Social thermoregulation refers to the process of increasing warmth in another individual by for example touching or sharing warmth (IJzerman et al., 2015). Evidence suggests that the description *heartwarming* should be taken literally. Feeling moved or touched has been consistently associated with a subjective increase of warmth in the chest (Seibt et al., 2015; Schubert et al., 2015b; Schnall et al., 2010; Cova & Deonna, 2014; Benedek & Kaernbach, 2011) in different cultures such as the U.S., Norway, Portugal, Israel or China (Schubert et al., 2015a). Moreover, ratings of being moved and warmth in the chest followed the same time course for six different moving videos (Schubert et al., 2015b). Further evidence comes from a study where participants had to color body parts

for different emotions and for activity increasing or decreasing (Nummenmaa, Glerean, Hari & Hietanen, 2013). Although the study did not include being moved per se, participants had to rate body activation and deactivation for the concept of *love*. Results indicate a subjective feeling of activation throughout the whole body and especially the chest region whereas negative affect was generally rated as causing less activation throughout the whole body. However, all of these findings are based on subjective reports. It is not yet clear whether body temperature or especially temperature around the chest region actually increase when people feel kama muta or stable CS. Moreover, evidence is mainly correlational. Hence, it is unknown whether feeling moved causes a warm feeling or whether the warm feeling is a precursor for a moving state.

Next to kama muta, warmth perceptions have also been reported after feelings of nostalgia (Zhou, Wildschut, Sedikides, Chen & Vingerhoets, 2012), a social emotion similar to kama muta (see Wildschut, Sedikides, Arndt & Routledge, 2006). After listening to nostalgic music individuals experienced more subjective physical warmth. Moreover, thinking about nostalgic experiences increased perceived ambient room temperature compared to a control condition (Zhou et al., 2012). However, these nostalgia studies did not specifically ask about feelings in the center of the chest.

**Closeness & Warmth**

Both closeness and warmth are not only concepts of communal sharing relations (IJzerman et al., 2015) but perception of *warmth* has also been identified as a central concept in the perception of other individuals (S.T. Fiske, Cuddy & Glick, 2007). The centrality of warmth has not only been attributed to perception but also to the action domain. Inducing ambient warmth was found to increase social proximity and relational focus (IJzerman & Semin, 2009), and to judging others to be more generous or acting pro-social (Williams & Bargh, 2008). In one study by IJzerman and Semin (2009) individuals holding a hot cup were likely to feel more overlap with a close person they knew compared to holding a cold cup (see Schilder, IJzerman & Denissen, 2014 for a replication). A different study found that participants felt more connected after holding a warm therapeutic pack in contrast to holding a ball of neutral temperature (Inagaki & Eisenberger, 2013). In the same experiment by Inagaki and Eisenberger the researchers measured brain activity in an fMRI scanner during experiences of social warmth (i.e. receiving positive messages from close ones) and physical warmth (i.e. holding a warm pack). Scanning results indicate that during both warmth experiences similar brain areas were active, in particular the ventral striatum and the middle

insula. This activation was not observed for a condition labeled to constitute just pleasantness (i.e. mild touch on the forearm). The authors conclude that physical and social warmth share a common neural mechanism.

In another study it was found that holding a hot cup decreased perceived distance towards an object and increased social affiliative motives in contrast to holding a cold cup (Fay & Maner, 2012). This effect was moderated by differences in attachment style. Low attachment avoidance and high attachment anxiety increased the priming-by-warmth effect. In the study by Schubert and colleagues (2015b) presented above participants had to make judgments of closeness among characters or subjective feelings of warmth in the chest continuously for different videos (Schubert et al., 2015b). Results indicate that ratings of the characters' closeness and feelings of warmth followed the same time course during the videos. Ratings for feelings of warmth in the chest increased when characters in the stimuli were evaluated as being closer and vice versa.

Some researchers have challenged the proposition that physical warmth might induce pro-social tendencies or increase interpersonal warmth. Lynott and colleagues (2015) tried to replicate the second study of Williams and Bargh's (2008) article. In the original study holding a warm therapeutic pack resulted in more pro-sociality than holding a cold pack. Pro-sociality was operationalized as offering participants a reward for themselves or for a friend. However, the replication study reported no difference between the warm or cold condition in rates of choosing a personal or pro-social reward. Considering the high power of the replication ($N > 800$) in contrast to the original study ($N = 53$) this provides some evidence against the link of warmth and pro-sociality.

Further research has not only investigated a link between warmth and increased social tendencies but also the other way around. Both social proximity (IJzerman & Semin, 2010) and positive communal traits (Szymkow, Chandler, IJzerman, Parzuchowski & Wojciszke, 2013) are associated with greater warmth perceptions. In one study IJzerman and Semin manipulated the physical distance between participants and confederates and later asked for estimates of the room temperature. Individuals that were placed closer to confederates estimated a higher temperature than their further away counterparts. In the same article, participants were also asked to name similarities with different individuals according to personality and traits, which increased estimates of room temperature. Szymkow and colleagues (2013) investigated responses to personality traits. They found that being presented with communal traits in contrast to agentic traits of a hypothetical person increased warmth

estimates. However, in a recent project these findings could not be replicated (Ebersole et al., 2015). Considering the high power of the different replication studies ($N$ = 3,119) it has to be concluded that there is little evidence that communal traits of a hypothetical person can lead to increased estimations of room temperature.

Not only is social proximity associated with heightened ambient temperature perceptions, but social exclusion is also linked to feelings of coldness in terms of perceptions and actual temperature. This is found to hold true for reporting lower temperature estimates after social exclusion (Zhong & Leonardelli, 2009), as well as an actual decrease in skin temperature measured at the index finger (IJzerman et al., 2012). Another study identified an association between loneliness and a higher tendency of warm bathing (Bargh & Shalev, 2012) although these findings could not be replicated (Donnellan, Lucas & Cesario, 2015a).[1] t

**The Interplay of Kama Muta, Closeness & Warmth**

To conclude, a bulk of empirical research has provided evidence for an interplay among being moved, closeness, and physical warmth. Recent studies have not only suggested that closeness increases being moved and vice versa but also that being moved increases feelings of warmth. Moreover, evidence points to a relation of closeness and warmth. Reviewing the literature on the relationship between communal feelings and warmth, two possible models emerge for the interplay among being moved, communal feelings and warmth (Figure 1). The first model would propose that when CS abruptly intensifies, this generates feelings of being moved, which would in turn trigger feelings of communality and internal warmth in the chest. These feelings of warmth would then cause an increase in experiencing communal feelings towards the elicitor (Figure 1, Model a). According to this model, feelings of warmth in the chest mediate the link between being moved and communal feelings. This view is supported by evidence reporting that warmth causes communal feelings (e.g. IJzerman & Semin, 2009).

The second model would suggest that intensifications of CS trigger experiencing being moved, which again results in feeling closer to the person associated with the intensified CS relation and warmth experiences in the chest. In turn, communal feelings trigger the perception of a warm feeling in the chest (Figure 1, Model b). Hence, according to this model communal feelings mediate the relation between being moved and warmth in the chest, which is supported by research reporting that communal feelings trigger warmth perceptions (e.g. IJzerman & Semin, 2010). Recent literature has provided evidence for both

[1] See the response by Shalev and Bargh (2014) and the reply Donnellan, Lucas and Cesario (2015b)

paths; communal feelings triggering warmth and vice versa. Therefore, it is complicated to predict the likability of one model over the other. A first exploratory investigation of the different models can provide a more detailed overview.

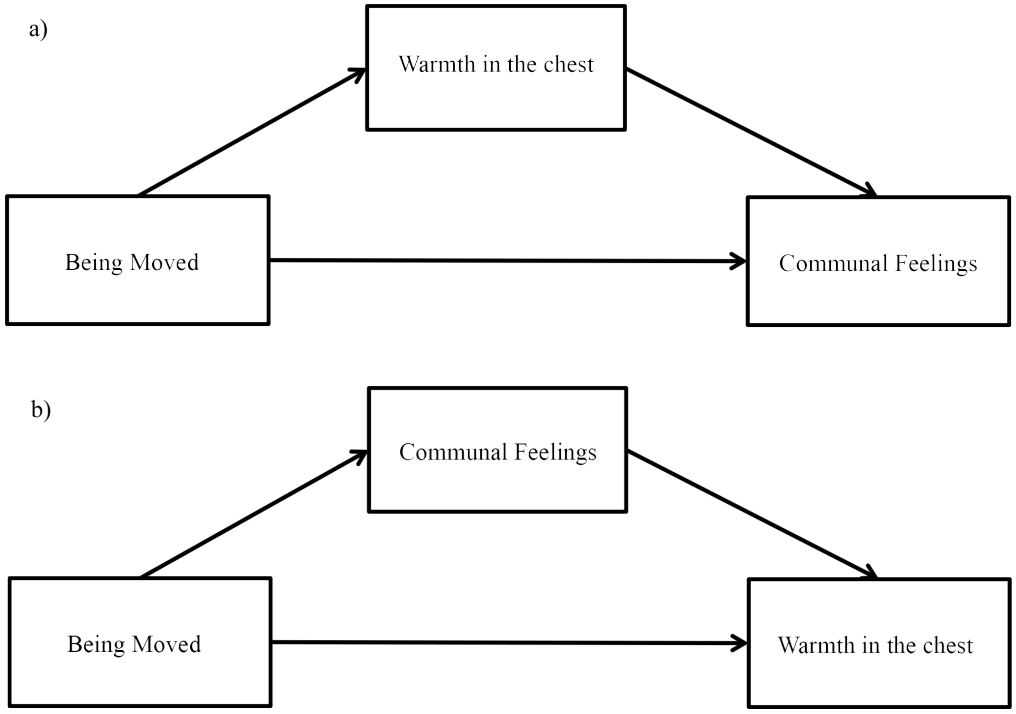


*Figure 1.* Different hypothesized causal models for the interplay between being moved, communal feelings and warmth in the chest. In model a) being moved causes feelings of closeness and warmth in the chest. At the same time feelings of warmth mediate the relation between being moved and closeness. Model b) is similar only differing in the fact that closeness feelings precede feelings of warmth in the chest and thereby mediate the link between being moved and warmth.

Based on past research and literature it is hypothesized that 1) the experience of kama muta leads to increased feelings of closeness and 2) kama muta results in an increase in subjective warmth perceptions especially in the chest. In a more exploratory fashion it is investigated 3) whether the interplay among being moved, communal feelings and warmth perceptions is mediated by communal feelings (Model b) or warmth in the chest (Model a). The question arises whether feelings of communal sharing might only refer to the individual(s) involved in the elicitation process or whether this tendency might *diffuse* and *generalize* to other targets or groups. Moreover, it is important to distinguish between an increase of internal and external warmth perceptions.

**Overview of the Current Studies**

The current article presents two studies that aim to investigate the relationship between kama muta, closeness and warmth perceptions. In the first study the link between

kama muta and increased closeness was investigated from a 1st and 2nd person point of view. The study was conducted in an online environment (Qualtrics on MTurk); it also tested whether communal sharing motivations would generalize to other individual targets. The second study aimed to replicate the basic findings of the first study and focused on 3rd person kama muta, that is, observing a sudden intensification of a communal sharing relation. In addition, the study explored the effects of kama muta on internal and external feelings of warmth. Trait empathy, as well as attachment style was assessed in both studies for exploratory reasons. Given the theoretical focus results are not provided and discussed in the present article.

**Methodological Considerations.** During the last years social psychological research procedures have been hotly debated due to replication issues or fraudulent research practices (e.g. Pashler & Wagenmakers, 2012; Simmons, Nelson & Simonsohn, 2011). Null hypothesis significance testing (NHST) has been the prevalent statistical method for the last decades albeit not free of controversy (Nickerson, 2000). One main issue with relying on NHST is the often faulty interpretation and the little informational value if utilized alone (Hoekstra, Finch, Kiers & Johnson, 2006). Researchers have advocated to include other measures such as effect sizes, power calculations and confidence intervals, though some of these are still considerably underrepresented in empirical research articles (Fritz, Scherndl & Kühberger, 2012). The present thesis provides effect sizes and confidence intervals or standard errors, where possible.

Moreover, a-priori power calculations were conducted for both studies utilizing G*Power (Faul, Erfelder, Lang & Buchner, 2007). For an ANOVA model with main and interaction effects with an effect size $f = .25$, $\alpha = .05$, a power of .95 and 3 groups, a total sample size of 251 was suggested. In order to compensate for the expected need to exclude participants based on exclusion criteria, a higher number of participants was sampled. In addition, an alternative statistical tool to NHST is introduced with the *v*-Statistic (Davis-Stober & Dana, 2014). The *v*-statistic presents a measurement of estimation accuracy and compares the ordinary least squares estimator (OLS) to a random least squares (RLS) method. The *v* measure expresses the probability that the OLS procedure and the sample means are more accurate than a totally random process of estimating these. A *v* of .99 would indicate the OLS estimates would be 99% more accurate than a random estimating process (Davis-Stober & Dana, 2014). Davis-Stober and Dana have proposed a benchmark *v* value of .50 as acceptable.

Both studies presented were examined and approved by the Internal Review Board of the Department of Psychology at the University of Oslo. In all studies, participants were given written information concerning study procedures, identity and contact information of the principal investigator, and compensation. Deception was not utilized in any of the two studies. Finally, participants indicated their consent by proceeding with the study and were debriefed about the purposes of the studies in the end.[2]

## Study 1: Closeness and Warmth with 1st and 2nd Person Kama Muta

The goal of the first study was to gain further insight into the relationship among kama muta, closeness and subjective feelings of warmth. Study 1 also tested whether communal sharing feelings were triggered only by experiences of kama muta or by other positive affective states as well. Hence, amusement was included as it is one of Fredrickson's (2013) positive emotions and has been utilized as a comparison in earlier experiments (e.g. Oliver et al., 2015). Amusement was included to investigate whether communal feelings are triggered by the positive aspects of affective states or whether these also contribute in unique ways. Moreover, the study aimed to test whether a generalization of closeness feelings would occur, spreading to other targets not involved in the emotion elicitation process. This possible generalization was tested for a target sharing relations with the elicitor and a more distant target.

The present study aimed to test effects of 1st and 2nd person experiences. In order to evoke these experiences participants were asked to think of and reflect on a specific episode including the targeted emotion and write a short summary on this episode. This method supposes that thinking and writing about an experience elicits the congruent feelings associated with the episode and has been successfully utilized in different research contexts such as clinical settings (e.g. Goodwin & Williams, 1982; Baker & Guttfreund, 1993).

Feelings of communal sharing were assessed with two different measurements; the communal strength scale (Mills et al., 2004), and the IOS scale (Aron, Aron & Smollan, 1992). The communal strength scale is designed to measure the feeling to respond to communal needs (Mills et al., 2004) and has been utilized in similar contexts before (Häfner & IJzerman, 2011). Clark and Mills' (2011; 1979) concept of communal relationships is strikingly similar to the communal sharing (CS) aspect of relational models theory (Fiske,

[2] Data and materials of all studies will be made public on osf.io, except for those parts that could make participants identifiable.

2004), both defined as relationship in which one wants to fulfill the needs of another individual or groups regardless of reciprocity. In fact, the CS subscale of the MORQ (Haslam & Fiske, 1999) has been associated with the communal strength measure (Simão & Seibt, 2014). The IOS scale presents a one-item pictorial measure that represents seven different degrees of overlap of two circles. The measure investigates closeness from a social cognitive perspective, defining it as the literal 'overlap' of selves (Aron et al., 1992). The first study tested the primary target, the mother, as well as the related target, the father with both the communal strength and IOS scale. Ratings for a close friend or distant target were assessed with the IOS scale only. Study 1 consisted of a 3 (emotion manipulation, between) x 2 (main closeness rating: elicitor, related target, within) x 2 (secondary closeness rating: close friend or distant acquaintance, between) design.

**Method**

**Participants.** In total 328 participants were sampled on Amazon MTurk, requesting only workers with at least 95% approval rate. Exclusion was based on nationality, participants with deceased parents and outliers (± 3 *SDs*) on the communal strength measure. This resulted in a final sample of 302 U.S. American participants consisting of 179 females (1 *other*) and ranging from 18 to 70 years of age ($M = 33.37$, $SD = 9.27$). Participants were paid $0.80 as compensation.

**Materials and Procedure.** After receiving instructions and giving informed consent participants were asked to provide two names; one of a close friend and one of a distant acquaintance.

Then participants were randomly allocated to a kama muta, amusement, or neutral condition. In all conditions participants were instructed to write a short segment of at least 200 characters about their mother or another caregiver who might have replaced their biological mother. In the kama muta condition individuals were first presented with a general idea of the feeling of being moved without including concepts such as closeness or warmth and then asked to think of and write about a ''moving or touching experience they shared with their mother''. The amusement condition instructed participants to write about a funny or amusing experience with their mother, while the neutral condition asked to describe a normal work day in the life of the participant's mother.

After finishing the short narrative participants were instructed to rate six items indicating how much they were *moved, touched, happy, sad, amused* or *uplifted* by the story on a 7-point scale ranging from *not at all* to *very much*. Then, physiological symptoms were

assessed on a 5-point scale ranging from *not at all* to *very much*, including *tears, moist eyes, warm feeling in the chest, chills/goosebumps, choking feeling of constriction in the throat, I smiled, I sighed or made a sound like Ahh,* and *I put my hand to my chest or face*.[3]

Afterwards participants were instructed to complete the communal strength scale (α = .91, Mills et al., 2004) with regard to their mother. The scale consists of 10 items assessing feelings of communal sharing on a 10-point scale ranging from *nothing at all* to *extremely*. The measure includes items such as ‘‘How much would you be willing to give up to benefit [x]?’’ or ‘‘How far would you be willing to go to visit [x]?’’, with higher scores representing higher communal strength. Then participants were presented with the IOS scale (Aron et al., 1999), which consists of two circles increasing in overlap on a 7-point scale, and were asked which image of circle overlap best represents their relationship with their mother. Finally, we presented three exploratory items targeting communal sharing motivations: whether participants want to give their mother a hug, and how much they want to call her on a 7-point scale ranging from *not at all* to *very much*. The third item instructed participants to imagine that they have won $10,000 and asked them how much they would like to share with their mother.

In order to test whether feelings of closeness might spread to other targets the exact same measures (CS scale, α = .93) were presented again but this time with regard to the participant’s father. In addition, participants were randomly presented with the name of either the close friend or the distant acquaintance whom they specified in the beginning of the study, and asked for the best representation of their relationship with that person on the IOS scale.

In the end, participants were presented with the Interpersonal Reactivity Index (IRI, Davis, 1983) an empathy scale measuring cognitive and affective empathic components.[4] Given the theoretical focus the fantasy subscale was omitted leaving subscales on perspective taking, empathic concern, and personal distress. Attachment was assessed with the revised Adult Attachment Scale (AAS, Collins, 1996), which consists of 18 items on 5-point scales creating three different attachment dimensions: close, dependent, and anxiety.

After providing demographic information participants were debriefed and thanked.

**Results**

**Manipulation Check.** Ratings on being moved and touched ($r$ = .86) were combined into a kama muta index. This compound measure was utilized for all analyses including kama

[3] Only *warmth in the chest* was analysed in the present study.
[4] Analyses on empathy and attachment are not presented in the results section given the main focus of the present thesis

muta. In order to test whether conditions evoked the respective affective states, ratings of being moved or touched and amusement were entered as a repeated factor with condition as a between-subjects factor in a repeated measures ANOVA. Between-subjects effects indicated a main effect for condition, $F(2,297) = 26.98$, $p < .001$, $\omega^2_p = .148$,[5] $v = .94$, while within-subjects effects indicated an interaction effect for condition and the ratings, $F(2,297) = 120.04$, $p < .001$, $\omega^2_p = .402$, $v = .99$. Kama muta ratings were highest in the kama muta condition ($M = 5.47$, $SE$[6] $= .20$) in contrast to the amusement ($M = 3.95$, $SE = .18$, $p < .001$) or neutral condition ($M = 3.83$, $SE = .18$, $p < .001$) (Figure 2, A). In parallel, reports of amusement were highest in the amusement condition ($M = 5.70$, $SE = .17$) in comparison to the kama muta ($M = 3.28$, $SE = .19$, $p < .001$) or neutral condition ($M = 2.84$, $SE = .17$, $p < .001$).

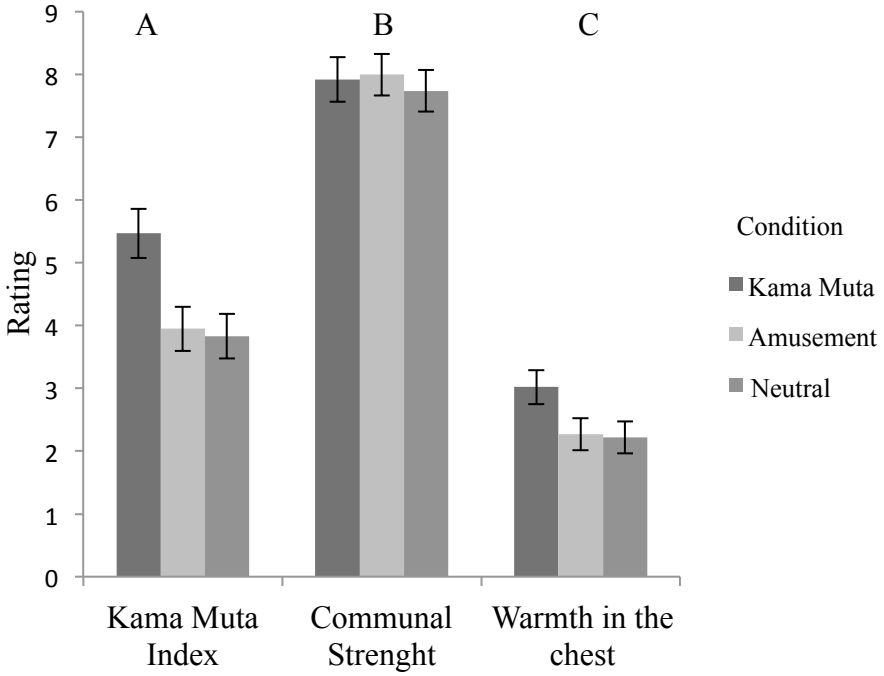


*Figure 2.* Mean ratings for the kama muta index (7-point scale), communal strength score (10-point scale) and warmth in the chest (5-point scale) for the three different conditions; kama muta, amusement and neutral in Study 1. Error bars represent 95% confidence intervals.

**Communal feelings.** Ratings on the communal strength scale for the mother were highly left-skewed. Therefore, scores were first reflected and then transformed with a log(10) transformation and finally reflected back. Graphical inspection of this transformed variable

[5] Throughout this article partial omega squared ($\omega^2_p$) is preferred over partial eta squared as a measure of effect size based on indications of being a less-biased estimator (e.g. Okada, 2013)

[6] Throughout this article Standard Errors (*SE*) are reported due to their feasibility of easily calculating confidence intervals around the mean. In order to calculate a 95% Confidence Interval the standard error needs to be multiplied by a z-score of 1.96 and then added to and substracted from the sample mean.

revealed an approximate normal distribution. Analyses involving the communal strength score of the mother utilized the transformed variable, whereas descriptives report the untransformed scores due to informative and interpretative value. Communal strength ratings for the father and the mother positively correlated with each other ($r$ = .38).

First of all, communal strength ratings of the mother were entered as dependent variable into an univariate model with condition as fixed factor. Results indicated no significant difference between the three conditions, $F(2,299) = .14$, $p = .866$, $\omega^2_p < .001$, $v = 0$. Ratings did not differ among the amusement induction ($M$ = 8.00, $SE$ = .17), kama muta group ($M$ = 7.92, $SE$ = .19, $p$ = .68) or the neutral condition ($M$ = 7.74, $SE$ = .17, $p$ = .62) (Figure 2, B). The same procedure was repeated for the IOS ratings of the mother. Again there were no main effects across groups, $F(2,299) = .36$, $p = .702$, $\omega^2_p < .001$, $v = 0$, with the amusement ($M$ = 4.65, $SE$ = .17), kama muta ($M$ = 4.86, $SE$ = .19, $p$ = .42) and neutral condition ($M$ = 4.79, $SE$ = .17, $p$ = .57) not differing from each other. Similarly no effect was obtained for the three exploratory items on hugging, making a call or sharing money ($F < 1$).

The same analyses were repeated for the ratings of the father. Again there was no main effect for communal strength ratings, $F(2,299) = .28$, $p = .756$, $\omega^2_p < .001$, $v = 0$, with amusement ($M$ = 6.86, $SE$ = .23), kama muta ($M$ = 6.71, $SE$ = .26, $p$ = .66) and neutral conditions ($M$ = 6.97, $SE$ = .23, $p$ = .74) not differing significantly. The same pattern was found for the IOS scale, $F(2,299) = 1.67$, $p = .191$, $\omega^2_p = .004$, $v = .25$, with ratings in the amusement ($M$ = 3.64, $SE$ = .19), kama muta ($M$ = 3.83, $SE$ = .22, $p$ = .52) and neutral condition ($M$ = 4.13, $SE$ = .19, $p$ = .07) not differing significantly from each other. Similarly no effect was obtained for the three exploratory items ($F < 1$).

Finally, the ratings on the IOS scale for a close friend or distant acquaintance were entered as a dependent variable in a respective univariate model with condition as fixed factor. Neither the close friend measure, $F(2,146) = .45$, $p = .641$, $\omega^2_p < .001$, $v = 0$, nor the distant measure, $F(2,149) = .81$, $p = .445$, $\omega^2_p < .001$, $v = 0$, indicated an overall significant main effect. Pairwise comparisons for the communal feelings measurement indicated no difference for ratings in the amusement condition ($M$ = 4.80, $SE$ = .23), the neutral one ($M$ = 5.09, $SE$ = .21, $p$ = .20), or the kama muta condition, ($M$ = 4.88, $SE$ = .25, $p$ = .60). Similarly, ratings in the distant condition did not differ across the kama muta ($M$ = 2.36, $SE$ = .24), amusement ($M$ = 2.19, $SE$ = .21, $p$ = .81) or neutral narrative ($M$ = 2.56, $SE$ = .23, $p$ = .53).

In order to test the general influence of kama muta on communal feelings the communal strength scores of the mother were added as a dependent variable in a linear

regression model with kama muta, amusement, as independent variables.[7] Results indicated that mother communal score was best predicted by kama muta, $B = .05$ [.04, .06], $\beta = .39$, $t(297) = 7.35$, $p < .001$, followed by amusement, $B = .02$ [.01, .03], $\beta = .16$, $t(297) = 2.94$, $p = .004$. The IOS rating for the mother was then added as a dependent variable to the same model indicating that the IOS ratings are best predicted by kama muta, $B = .35$ [.25, .45], $\beta = .38$, $t(297) = 7.13$, $p < .001$, followed by, amusement, $B = .12$ [.04, .20], $\beta = .14$, $t(297) = 2.65$, $p = .008$.

The same procedure was repeated with the communal strength score of the father; the kama muta variable reached significance, $B = .25$, [.11, .39], $\beta = .20$, $t(297) = 3.53$, $p < .001$. Amusement was only a marginal predictor, $B = .13$, [.003, .25], $\beta = .12$, $t(297) = 2.01$, $p = .045$. The same model with the IOS ratings for the father, the distant and close measure as dependent variable did not reveal any effects.

In order to test the general influence of kama muta on the communal feelings in the different conditions a mediation analysis was performed with condition as the independent variable, communal feelings as the dependent and kama muta as the mediator. Condition was contrast coded by two orthogonal variables; the first comparing the kama muta condition (2/3) to the other two (-1/3) and a second comparing the amusement (1/2) to the neutral group (-1/2). These two variables were both added as independent variables (Hayes & Preacher, 2014). Mediation analysis was performed based on the MEDIATE dialog by Hayes and Preacher (2014) always generating 10000 bootstrap samples. Results found an indirect effect of $B = .72$ with a 95% confidence interval ranging from .48 to 1.03 for kama muta on the relation between the first contrast and communal feelings (Figure 3). This indicates that the communal ratings in the kama muta condition increase through reports of being moved in contrast to the control conditions. The 95% confidence interval for the indirect effect on the link between second contrast and communal feelings included zero and was therefore not significant.

[7] Gender was always first included in all regression models in this Results section, but did not indicate any significant effects and was excluded in the final models unless reported differently.

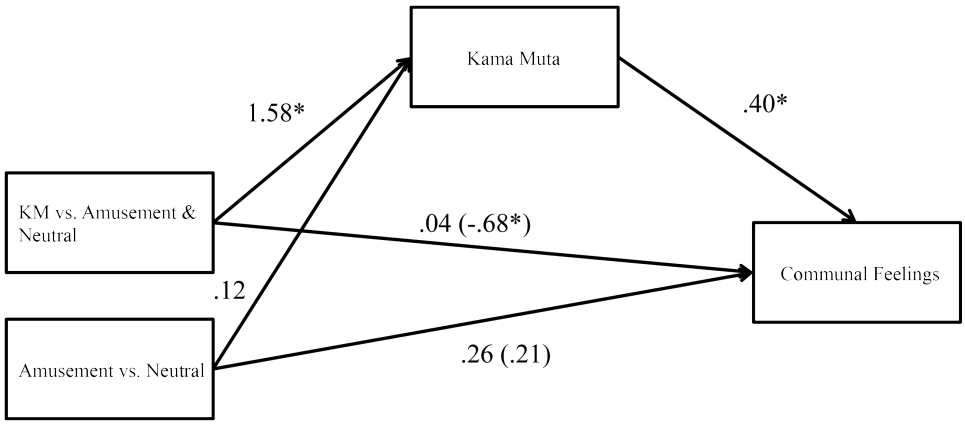


*Figure 3.* Unstandardized regression coefficients for the interplay between the manipulation, communal feelings and kama muta. The manipulation is contrast coded with two variables; one comparing the kama muta condition to the other and the other comparing amusement and the neutral group. Coefficients in parentheses present the relation of the condition on communal feelings controlling for kama muta.

**Warmth Perceptions.** Ratings of warmth in the chest were added as dependent variable in a univariate analysis with condition as fixed factor. Results indicated a main effect across conditions, $F(2,299) = 10.95$, $p < .001$, $\omega^2_p = .062$, $v = .87$, with ratings for warmth in the chest highest in the kama muta condition ($M = 3.02$, $SE = .14$) in contrast to the amusement ($M = 2.27$, $SE = .13$, $p < .001$) and neutral condition ($M = 2.22$, $SE = .13$, $p < .001$) (Figure 2, C).

In order to test the general effect of kama muta on warmth in the chest the warm feeling item was added as a DV in a linear regression model with kama muta and amusement as independent variables. Warmth in the chest was only predicted by kama muta, $B = .40$ [.24, .46], $\beta = .58$, $t(297) = 12.270$, $p < 001$.

Again, the effects of kama muta on the relation between the manipulation and warmth in the chest were investigated by utilizing the two contrast coded variables for the condition as IV, warmth in the chest as DV and kama muta as a mediator. The MEDIATE procedure indicated an indirect effect of $B = .64$ with a 95% confidence interval ranging from .45 to .85 for kama muta on the first contrast, indicating that the kama muta condition increases ratings of warmth in the chest through reports of being moved. There was no significant effect for the second contrast variable.

**Interplay of Being Moved, Communal Feelings & Warmth.** In order to test for a possible mediation effect of reports of warmth in the chest on the relationship between kama muta and communal feelings, a mediation analysis was performed utilizing PROCESS

(Hayes, 2012). Two different models were created: one with the communal score of the mother as dependent variable and a second one with the communal score of the father as DV. For both models utilizing bootstrap procedures the significance of the indirect effect was tested with 10000 bootstrapped samples and a confidence interval of 95% (cf. Shrout & Bolger, 2002). Results indicated an indirect effect of .02 with a 95% confidence interval ranging from -.05 to .08 ($R^2_{med}$ = .08, [.03, .13]), thus not reaching significance. For the second model with the father's communal score as dependent variable this procedure was repeated with results yielding an indirect effect of .06 with a 95% confidence interval ranging from -.05 to .17 ($R^2_{med}$ = .03, [.01, .07]), thus not reaching significance. The procedure was repeated with the communal strength scores for the mother and father as mediating variable, kama muta as IV and warmth in the chest as DV. However, for both models the 95% bootstrap confidence interval included zero, hence not reaching significance.

**Discussion**

The first study investigated the hypotheses whether feeling moved triggers feelings of closeness and warmth in the chest. In addition, it was hypothesized on an exploratory basis that feelings of warmth in the chest mediate the relationship between being moved and closeness or that closeness mediates the relation between being moved and warmth in the chest.

Results for the first study indicate that communal feelings for either parent and for either close or distant acquaintance did not differ across the different affective states produced by the manipulation. Being in an amusing, moved or neutral state produced virtually the same results. However, taking a correlational view communal feelings for the target of the elicitation were best predicted by feelings of kama muta. This effect also partly diffused to an uninvolved target, in this case the father. Although the communal ratings did not differ across conditions, a mediation analysis found that the relation between condition and communal feelings was mediated by kama muta. The manipulation had an indirect effect on communal feelings through feeling moved. These findings provide partial support for the first hypothesis that kama muta increases closeness. Moreover, the first study suggests that reports of warmth in the chest are most pronounced when experiencing kama muta in contrast to other affective states supporting the second hypothesis. Finally, no mediation effect of warmth on the link between kama muta and closeness was observed. This was also not observed for closeness as a mediator on the relationship of kama muta and warmth thus, failing to support the third hypothesis.

A major issue with the present study seems to be the manipulation. Although the kama muta condition was perceived as most moving a substantial part of participants were still moved to a high degree in the neutral condition. In fact, mean ratings easily exceeded the midpoint of the scale. Instructing participants to think about ‘‘a regular work day of their mother’’ may have induced feelings of kama muta in different ways. First, several participants wrote about how their mother prepared food and cooked for them; this is a form of commensalism typically constituting communal sharing relations (Fiske, 2004). Moreover, realizing the amount of work their mother has done or still does for them participants might felt kama muta from their mothers’ altruistic effort.

In addition, communal feelings were best predicted by feelings of kama muta replicating earlier correlational findings (Seibt et al., 2015; Schubert et al., 2015a; Schubert et al., 2015b). Closeness was better predicted by kama muta than amusement controlling for the other variables. Of course, the present study does not rule out the possibility that other positive emotions can trigger communal sharing motivations, but it does support the hypothesis that kama muta evokes stronger communal sharing feelings than amusement. The relationship between communal strength and kama muta was also found for an uninvolved target (father) though the effect was much weaker than for the communal relationship with the 2$^{nd}$ party who elicited kama muta (mother). In fact, the communal scores for the father and mother correlated substantially with each other. Hence, the relationship for kama muta and the father’s communal ratings might be due to carryover effects. The second study in this article will need to test whether there might actually be something like a generalization effect.

In contrast to another positive or neutral state, kama muta was associated with increased reports of feelings of warmth in the chest. This finding enhances the correlational evidence for the relationship between kama muta and warmth. Warmth in the chest was in addition predicted only by feelings of being moved and not by amusement. However, the item utilized did not ask whether feelings of warmth were limited to the chest region or were also felt elsewhere in the body. Evidence suggests that this might actually be the case (Nummenmaa, Glerean, Hari & Hietanen, 2013).

The feeling of warmth in the chest did not mediate the relationship between kama muta and closeness nor did closeness mediate the relation between kama muta and warmth in the chest. Both feelings of closeness and warmth in the chest were found to be associated with being moved, however, no clear causal pathway could be established among the three variables. The second study needs to shed more light on this interplay.

In sum, the first study provided intial insight and partial support for two of the main hypotheses, but not for the mediation hypothesis. The second study was designed to extend these findings, build on them and testing possible effects from a 3rd person kama muta perspective.

## Study 2: Closeness and Warmth with 3rd person Kama Muta

The first study provided intial insight into the relationship among kama muta closeness and warmth. While the first experiment focused on 1st or 2nd person experiences of kama muta the second study was designed to investigate the effect of 3rd person feelings. Third person perspectives are defined as observing other individuals, groups or targets suddenly increasing their communal sharing relations. In third-person kama muta, either one or both of the observed targets may initiate the intensification. Whilst the first experiment looked only at perceptions of internal warmth the second study extended these measurements to perceptions of external warmth. The study again included a measure on the generalization of a possible kama muta closeness link, albeit in a condensed version. Finally, the three exploratory items on communal sharing motivation included in the first study were dropped.

### Method

**Participants.** In total 424 participants were sampled via MTurk, requesting only workers with at least 95% approval rate. Exclusion was based on nationality, missing demographics and outliers on the temperature estimate item (± 3 *SDs*), leaving 400 U.S. participants (201 males, 198 females, 1 *other*) ranging from 19 to 69 years of age ($M$ = 36.09, $SD$ = 11.70) who were paid $0.90 as compensation.

**Materials and Procedure.** After receiving instructions and giving informed consent participants were asked to name one close friend and one distant acquaintance.

Then, participants were randomly allocated to a kama muta, neutral or amusement condition. Hence, the study again consisted of a between-design with 3 different emotion conditions. Participants were instructed to listen to an audio recording that lasted about 2 minutes, in which a woman recounted her life as a coffee shop owner. The content of the story differed across conditions; in the kama muta condition she told how she gave away free coffee to homeless people and in the end was surprisingly repaid for her kindness. In the amusement condition the protagonist was confronted with rude customers who in the end got their comeuppance by sitting on a pie. In the neutral condition the woman described the interior of her café. These narratives were rated in a pilot study and recorded by a female native speaker of English.

After listening to the narrative participants were instructed to rate how much they were *moved, touched, happy, sad, amused,* or *uplifted* by the story using a 7-point scale ranging from *not at all* to *very much*. Then, physiological symptoms were assessed on a 5-point scale ranging from *not at all* to *very much*, including *tears, moist eyes, warm feeling in the chest, chills/goosebumps, choking feeling of constriction in the throat, I smiled, I sighed or made a sound like Ahh, I put my hand to my chest or face* and *other*.[8]

Then, participants were presented with a number of questions asking them to rate their environment. Among questions about brightness of their surroundings or whether they were distracted, individuals were instructed to try to estimate their room temperature in degrees Fahrenheit without checking a thermostat or thermometer. Afterwards, participants had to rate as how difficult they perceived the task. This procedure was adapted from IJzerman and Semin (2010). It should be noted that an effect obtained with this procedure will feature a considerable large error variance given that temperatures differ randomly across participants and cannot be controlled.

Afterwards, participants were presented with the communal strength scale ($\alpha = .91$, Mills et al., 2004) with regard to the protagonist of the audio narrative.

In order to investigate whether closeness judgements generalise to other targets participants were randomly presented with either the name of the close friend or the distant acquaintance whom they specified in the beginning of the study. They were presented with the IOS scale (Aron et al., 1992) and were asked which degree of circle overlap best represents their relationship with the target.

Then participants were presented with the Interpersonal Reactivity Index (IRI, Davis, 1983) empathy scale, again omitting the fantasy subscale. Thus, leaving subscales on perspective taking, empathic concern, and personal distress. Finally, attachment was assessed again with the revised Adult Attachment Scale (AAS, Collins, 1996), yielding measures of three different attachment dimensions: close, dependent, and anxiety.[9]

After providing demographic information participants were debriefed and thanked.

**Results**

**Manipulation Check.** The two items on moved and touched ($r = .92$) were combined into a single predictor. This index was added with the amusement rating as a repeated measure in a repeated measures ANOVA. Condition was entered as between-subjects factor.

[8] Only *warmth in the chest* was analysed in the present study.

[9] Analyses on empathy and attachment are not presented in the results section given the main focus of the present thesis

There was a main effect for condition, $F(2,397) = 22.54$, $p < .001$, $\omega^2_p = .10$, $v = .93$, while within-subjects effects indicated an interaction effect for condition and the ratings, $F(2,397) = 228.74$, $p < .001$, $\omega^2_p = .532$, $v = .99$. Pairwise comparisons revealed that individuals were most moved by the kama muta condition ($M = 5.73$, $SE = .14$) compared to the amusement ($M = 2.50$, $SE = .14$, $p < .001$) or neutral condition ($M = 3.33$, $SE = .14$, $p < .001$) (Figure 4, A). Participants reported being most amused after listening to the amusing story ($M = 4.67$, $SE = .15$) in contrast to the kama muta ($M = 2.71$, $SE = .15$, $p < .001$) or neutral narrative ($M = 2.96$, $SE = .15$, $p < .001$).

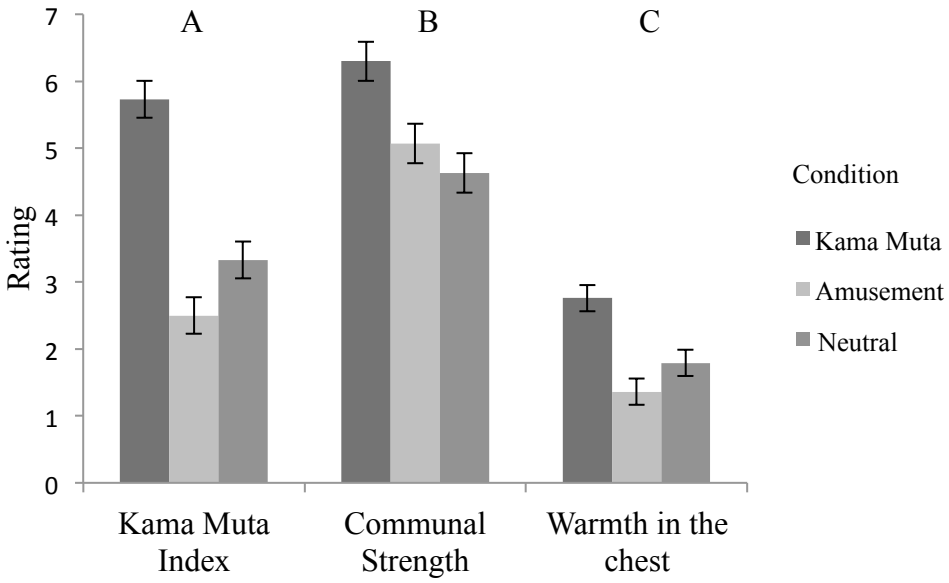


*Figure 4*. Mean ratings for the kama muta index (7-point scale), communal strength score (10-point scale) and warmth in the chest (5-point scale) for the three different conditions; kama muta, amusement and neutral in Study 2. Error bars represent 95% confidence intervals.

**Communal feelings.** In order to test whether participants felt more communal to the protagonist of the narratives the mean score of the communal strength scale was added as a dependent variable into a univariate model with condition as fixed factor. Results indicated an overall main effect of, $F(2,395) = 34.25$, $p < .001$, $\omega^2_p = .143$, $v = .99$. Pairwise comparisons revealed that communal feelings were highest in the kama muta condition ($M = 6.30$, $SE = .15$) compared to the amusement ($M = 5.07$, $SE = .15$, $p < .001$) or neutral condition ($M = 4.63$, $SE = .15$, $p < .001$), whilst communal feelings in the amusement condition were higher than in the neutral one, $p = .042$ (Figure 4, B).

Moreover, it was tested whether stronger communal feelings would extend to individuals other than the narrator herself. The ratings on the IOS scale for a close friend or

distant acquaintance were entered as a dependent variable in a respective univariate model with condition as fixed factor. Neither the close friend measure, $F(2,196) = .25$, $p = .778$, $\omega^2_p = -.007$, $v = 0$, nor the distant acquaintance measure, $F(2,198) = .20$, $p = .816$, $\omega^2_p = -.008$, $v = 0$, were affected by the type of narrative the participants heard. Pairwise comparisons of communal feelings towards a close friend indicated no difference for ratings in the amusement condition ($M = 4.99$, $SE = .21$), the neutral one ($M = 4.83$, $SE = .21$, $p = .601$), or the kama muta condition, ($M = 4.78$, $SE = .22$, $p = .499$). Similarly, ratings of closeness to a distant acquaintance did not differ across the kama muta ($M = 2.16$, $SE = .16$), amusement ($M = 2.30$, $SE = .17$, $p = .571$) or neutral narrative ($M = 2.29$, $SE = .18$, $p = .605$).

In order to test the general influence of kama muta on communal feelings the communal strength measure was entered as a DV in a linear regression model with kama muta and amusement as independent variables.[10] Communal feelings with the narrator was best predicted by kama muta, $B = .51$, [.43, .59], $\beta = .58$, $t(395) = 14.28$, $p < .001$, followed by amusement, $B = .15$, [.07, .23], $\beta = .16$, $t(395) = 3.91$, $p < .001$, when controlling for the other variables. The same procedure was repeated in two different models for the IOS ratings of the close friend and distant acquaintance. The measure for the distant other revealed only an effect for amusement, $B = .12$, [.02, .22], $\beta = .17$, $t(198) = 2.39$, $p = 018$. The rating for the close friend revealed no significant predictors.

As in the first study the effect of kama muta on the relation between the manipulation and communal feelings was investigated by utilizing again the same two contrasts for the condition as IV (1st contrast: kama muta (2/3) vs. amusement (-1/3) and neutral (-1/3); 2nd contrast: neutral (1/2) vs. amusement (-1/2)), closeness as DV and kama muta as the mediator. On the relation between the first contrast and communal feelings kama muta indicated an indirect effect of $B = 1.53$ with a 95% confidence interval ranging from 1.22 to 1.87. This indirect effect suggests that the kama muta condition increase communal feelings in contrast to the other conditions through reports of feeling moved. Moreover, an indirect effect by kama muta on the relation between the second contrast and communal feelings emerged ($B = -.45$ [-.71, -.24]). This indirect effect indicates that in contrast to the neutral the amusement condition increases communal feelings trough ratings of being moved.

**Warmth Perceptions.** Perceptions of warmth were investigated with two different items. One item measured internal whilst the other measured external temperature perceptions

[10] Gender was always first included in all regression models in this results section, but did not indicate any significant effects and was excluded in the final models unless reported differently.

($r$ = .00). The item on whether participants felt warmth in their chest and the item on estimating room temperature were regressed on condition in two univariate models. There was a main effect of type of narrative on experiencing a warm chest, $F(2,394) = 50.74$, $p < .001$, $\omega^2_p = .200$, $v = .99$, with the kama muta condition ($M = 2.76$, $SE = .10$) differing significantly from both amusement ($M = 1.36$, $SE = .10$, $p < .001$) and the neutral induction ($M = 1.79$, $SE = .10$, $p < .001$) (Figure 4, C). The neutral condition differed significantly from the amusing narrative, $p = .003$. The three types of narratives did not affect room temperature estimation, $F(2,395) = 1.51$, $p = .222$, $\omega^2_p = .003$, $v = .23$. Neither the kama muta ($M = 73.36$, $SE = .40$) nor the neutral one ($M = 72.41$, $SE = .40$) or the amusement condition ($M = 73.11$, $SE = .41$) significantly differed from each other.

In order to test the general influence of kama muta on feelings of chest warmth, the warmth chest was added as a DV in a linear regression model with kama muta and amusement as independent variables. Results indicated that warm feelings were best predicted by kama muta, $B = .40$, [.36, .44], $\beta = .64$, $t(394) = 16.50$, $p < .001$. No other main or interaction effects reached significance. The same procedure was repeated for the room temperature estimate; none of the variables were significant predictors.

Again, the effect of kama muta on the relation between the manipulation and warmth in the chest was tested with the two contrast coded variables for the condition as IV, warmth in the chest as DV and kama muta as mediator utilizing MEDIATE. Results indicated an indirect effect of $B = 1.07$ with a 95% confidence interval ranging from .83 to 1.30 for kama muta on the relation between the first contrast and closeness. This indirect effect indicates that in contrast to the control conditions the kama muta condition increases perception of warmth in the chest through feelings of being moved. In addition, an indirect effect for kama muta on the relation between the second contrast and communal feelings was present ($B$ = -.30 [-.48, -.16]). This indirect effect indicates that the amusement condition predicts warmth in the chest through feelings of being moved or touched.

**Interplay of Being Moved, Communal Feelings & Warmth.** A mediation analysis of warmth perceptions in the chest on the relationship between feeling moved and communal feelings was carried out utilizing PROCESS (Hayes, 2012). In two different models communal feelings were added as outcome variable, kama muta ratings as the independent variable, whilst perceptions of warmth in the chest or room temperature estimates functioned as possible mediator. For the first model utilizing bootstrap procedures the significance of the indirect effect was tested with 10000 bootstrapped samples and a confidence interval of 95%.

Results showed an indirect effect of $B$ = .12 with a 95% confidence interval ranging from .06 to .18 ($R^2_{med}$ = .21, [.16, .28]), thus reaching significance (Figure 5). Finally, another model included the communal feeling as mediator, kama muta as the IV and warmth in the chest as DV. Results found an indirect effect of $B$ = .07 and a 95% ranging from .03 to .10 ($R^2_{med}$ = .22, [.16, .28]) reaching significance (Figure 6).

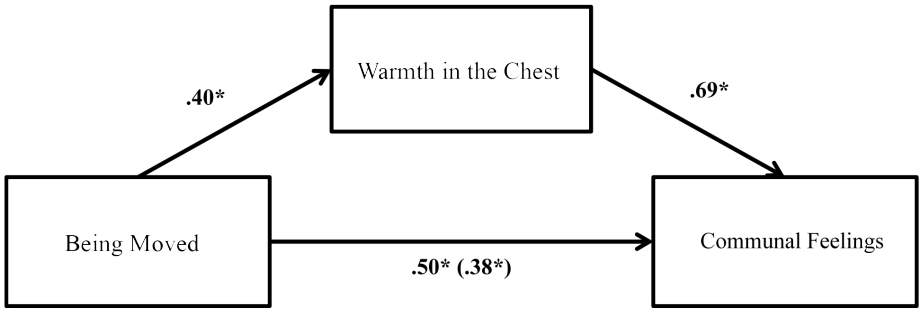


*Figure 5*. Unstandardized regression coefficients for the relation among being moved, communal feelings and warmth in the chest. Coefficients for the relation between being moved and communal feelings controlling for warmth in the chest is provided in parantheses. *$p$ < .001

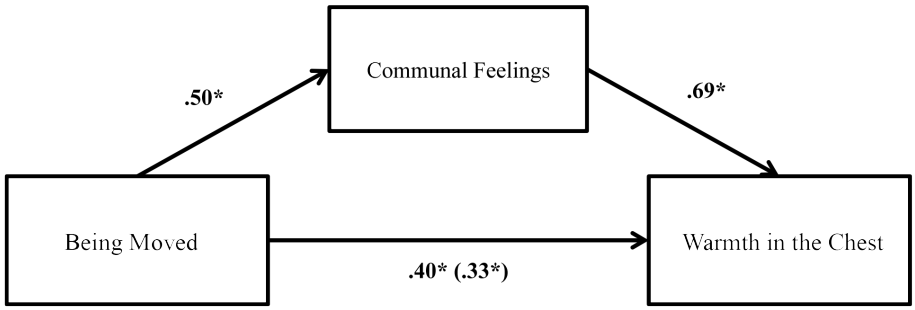


*Figure 6.* Unstandardized regression coefficients for the relation among being moved, communal feelings and warmth in the chest. Coefficients for the relation between being moved and warmth in the chest controlling for communal feelings is provided in parantheses. *$p$ < .001

**Discussion**

Focusing on 3rd person experiences of being moved the present study adopted the hypotheses from the first study. First, being moved was argued to trigger both communal feelings and warmth in the chest. In addition, the exploratory third hypothesis postulated that warmth mediates the relationship between being moved and closeness or that closeness mediates the relationship between being moved and closeness.

Findings from the first study were extended. Results from the second study indicated that kama muta induces higher communal sharing motivation than an amused or neutral state, supporting the first hypothesis. Again, increased closeness did overall not generalize to other

targets. The second study replicated findings from the first study that kama muta is associated with feelings of warmth in the chest, but amusing or neutral narratives are not. Again, through the experimental manipulation, supporting the causal mechanism of the second hypothesis. This finding did not extend to external warmth perceptions. Finally, in contrast to the first study the third hypothesis was supported. Results suggested that internal warmth partially mediates the link between kama muta and closeness. Feelings of closeness did also partially mediate the relation between kama muta and warmth in the chest.

Although partly observed in the first study, in Study 2 closeness ratings toward a close friend or distant acquaintance after hearing the kama muta narrative were no different from ratings after hearing an amusing or neutral narrative. In order to compress the length of the present study the communal strength scale for the secondary targets was dropped leaving only the one item IOS scale. This might have decreased variance in the communal ratings. A possible measurement improvement would be to include a pre-measure of closeness before the manipulation. While in the first study the indirect target (father) shared some characteristics with the emotion elicitor (the mother), in Study 2 the indirect target was a close friend or distant acquaintance.

Whereas kama muta did trigger internal feelings of warmth this did not hold true for external perceptions, in this case the temperature of the surrounding environment. In general, these ratings lack control due to the fact that participants' actual room temperature could not be observed and might have differed significantly. Moreover, results suggested no relationship between internal and external warmth perceptions, which is in line with previous research (IJzerman, Janssen & Coan, 2015).

Moreover, in contrast to the first experiment, results of Study 2 suggest that the subjective feeling of warmth at least partially mediates the relationship between kama muta and closeness. This would indicate that feeling warmth could enhance the effects of being moved on closeness, which is in line with previous literature (e.g. IJzerman & Semin, 2009). On the other hand, a partial mediation effect was also present with the communal feeling as a mediator on the kama muta-warmth link as found in previous studies (e.g. IJzerman & Semin, 2010). It is therefore arguable which causal mechanism is to be preferred. Do feelings of warmth precede feelings of closeness or vice versa? The indirect effect for warmth as a mediator ($B$ = .12) was stronger than the indirect effect for communal feelings as the mediator ($B$ = .07), though not differing significantly. One argument against warmth as a mediator is that individuals sometimes report feelings of kama muta without perceiving an increase of

warmth in their body. On the other hand, it would be interesting to investigate whether a feeling of warmth in the chest can occur without being triggered by a communal sharing feeling, motivation or experience. Individuals who do not report warmth in the chest might be focusing on other physiological symptoms such as tears. In parallel it would be important and of peculiar interest to establish whether in kama muta only subjective temperature perceptions increase or chest temperature actually increases or whether some other physical process creates this sensation.

## General Discussion

Although the feeling of being moved or touched is widely known and individuals report it on a regular basis the effects of this affective state have been widely ignored and under-researched. Based on the kama muta framework and thereby also relational models theory the present article posits that being moved triggers experiences of communal sharing and feelings of warmth in the chest. Moreover, it is argued that either subjective perceptions of warmth in the chest mediate the relationship between being moved and closeness or similarly feelings of closeness mediate the link between being moved and warmth in the chest.

In two highly-powered online studies including more than 700 participants in total, the hypotheses were mainly supported. While the first study examined 1$^{st}$ and 2$^{nd}$ person experiences of being moved the second study examined 3$^{rd}$ person experiences. Although the first study found no difference for closeness ratings among the three conditions, it still provided correlational evidence that being moved predicts closeness and communal feelings more than amusement. Moreover, a mediation analysis established that communal feelings increased for the kama muta condition through feeling moved. The second study replicated these findings and also obtained a main effect for the audio narrative manipulation. Participants who listened to the kama muta narrative reported more communal feelings towards the narrator than those who listened to an amusing narrative or to a description of the furnishings of the café.

The first study provided some evidence that 1st person or 2nd person closeness effects may generalize or extend to other uninvolved individuals. This effect was not replicated for 3$^{rd}$ person experiences. The second main hypothesis, that kama muta triggers warmth, was supported in both experiments. Being induced with a moving/touching affective state led to higher reports of warmth in the chest, while neither an amusing nor neutral state did so. The second experiment also presented evidence that kama muta induces internal, as assessed with

warmth in the chest, but not external warmth, the estimation of room temperature. Finally, perceptions of warmth in the chest partly mediated the relationship between kama muta and closeness in the second experiment. On the other hand, a partial mediation effect was also found for communal feelings on the relation between kama muta and warmth in the chest. These effects were not present in the first study. These results partly support the third exploratory hypothesis.

**Kama Muta & Closeness**

Extending previous research that has associated being moved with subjective closeness, the present experiments provide evidence that being moved triggers communal sharing feelings. In contrast to a neutral and an amused affective state, feeling moved resulted in increased feelings of communality. On the other hand, these studies only controlled for one other positive emotion, amusement. It is possible that other positive emotions such as awe or non-social joy evoke sentiments of closeness. Is the effect of positive feelings on closeness based solely on their positivity as suggested by the broaden-and-build hypothesis (Fredrickson, 2013) or do they all contribute in unique ways? In Study 2 communal feelings were marginally higher after listening to an amusing story in contrast to a neutral one. Hence, positive affect in general seems to trigger higher feelings of closeness than a neutral affective state. It remains to be tested whether kama muta evoked higher communal feelings than amusement because it was experienced as more positive or whether the affective state features other unique factors that trigger closeness (e.g. communal sharing). Positivity was not controlled for in the present studies and should be incorporated in future research attempts.

This in turn also motivates the question how much the various positive emotions presented by Fredrickson (2013) overlap with kama muta. It is vital for future research to disentangle different concepts and empirically show overlap and distinction between different emotion categories. However, at present, emotion categories are often tacitly defined, if all. Conceptualizations are often based on vernacular terms, usually English, neglecting differences in cultural manifestations. *Happiness,* for example, is a concept often utilized in emotion research. However, definitions of ‘happiness’ are often ambiguous or non-existent. What are the common characteristics of the affective state, ‘happiness’? Are there certain prototypical physiological markers or facial expressions for this emotion (cf. Keltner, Ekman, Gonzaga & Beer, 2003; Jack, Garrod, Caldara & Schyns, 2012)? Is it universal or is it caused by different experiences and manifestated differently in different cultures? All these issues impede and complicate the empirical study of different emotion categories, if these exist at

all. Moreover, the perception of a peculiar emotion is subject to the subjective experience of an individual and its labeling utilizing vernacular terms (Barrett, 2012). Hence, future research needs to reduce vernacular labels and utilize a more cultural-dependent, bootstrapping approach to the epistemological study of emotions (Fiske, Schubert & Seibt, in press). This does not mean that vernacular terms should be ignored; for one thing, self-report depends on them. However, definitions of emotional concepts should not be solely based on the particular, more or less culture-specific lexicon of any one language. The kama muta construct and theory provides one example of an approach that encompasses and integrates cultural diversity in the elicitors and manifestations of a psychological process.

The present studies provide evidence that being moved increases closeness towards targets involved in the elicitation process. The communal sharing relations that are intensified in order to trigger feelings of kama muta are thus in turn affected. It is interesting whether this effect would spread to other CS relationships that were not intensified a priori. The present studies provide only partial evidence on this issue and it needs to be concluded that closeness to other uninvolved individuals is not increased. Ratings of relationships with a close or distant other whose CS relations were not intensified when the participant felt closer to her mother, or was moved by third parties feeling closer. However, the first study provided some evidence that a generalization might occur if the other target relates communally to the second party. Communal ratings towards the father were significantly predicted by kama muta and only marginally by amusement. Because the main target of the elicitation was the participant's mother it might be that group schema or concepts are activated by spreading activation (cf. Bower, 1992) or semantic priming (Haänze & Hesse, 1993). One possible explanation might be that different targets need to either be in a communal relationship with each other, or be classified by the perceiver as members of the same category, such as "my parents". In fact, communal sharing relations are transitive (Fiske, 2004) and in this example the father shares a CS relation with the mother as well. Some evidence suggests that a generalization process might be true for more abstract group constructs and classification, such as *humankind* or *Norwegians* (Oliver et al., 2015). In the experiment by Oliver and colleagues, participants reported more connectedness towards different racial groups after watching a moving video in contrast to an amusing or neutral clip. However, the authors note that the stimulus inducing being moved was especially chosen *not* to focus on a particular racial group.

According to relational models theory, the proposition that closeness might spread at the group level seems plausible. Communal sharing relations focus especially on a greater common good that bonds different individuals and not on the individual herself (Fiske, 1992; 2004). Hence, watching a moving clip about refugees might induce closeness to the whole category of refugees but perhaps not to particular individuals belonging to that group or similar groups. Evidence suggesting that positive affective states induce global instead of a local cognitive processing lend further support to this possibility (Gasper & Clore, 2002; Fiedler, 2001). This view is partly similar to Cova and Deonna's (2014) proposition concerning the action tendencies of being moved. They argue that observing a moving stimulus about family relations induces a reordering of values in which one's own family relations become prioritized (Cova et al., 2014). This might also occur on a more abstract level. Watching a touching video about refugees might result in a reordering of the importance of that peculiar group.

Another possibility is that communal sharing intentions might spread to similar relationships. The basis of kama muta is intensification of communal sharing relations. Intensifying one CS relationship might spread to other CS relationships that are congruent, that is CS relations being implemented according to the same template. When watching a moving video in which a father does something extraordinary altruistic for his son, one's own father-son CS relation might be made salient and therefore become closer. Would this also translate to other family members such as a mother or daughter? The present article provides only limited support for the proposition that kama muta evokes generalized intensification of communal feelings spreading far beyond the second person in the initially intensified communal relationship. It should also be noted that communal feelings were for some targets assessed with the 10-item communal strength scale and on other occasions with the one-time IOS scale complicating comparison across measures. Investigation of a generalization or diffusion was not the main focus of the present studies and therefore results are rather exploratory. Future research would need to test and disentangle whether being moved might generalize closeness feelings on a group or relationship level.

**Kama Muta & Warmth**

Next to physiological markers of crying, piloerection, chills or moist eyes, feelings of warmth in the body and especially the chest region are prototypical for intense reactions kama muta (Seibt et al., 2015). The present article provides two pieces of evidence that feeling moved or touched triggers reports of warmth in the chest more often than a neutral or amusing

state. Although feelings of being moved and warmth in the chest have been linked in previous studies (e.g. Seibt et al., 2015) the present experiments comprise the first demonstration of a causal relation; showing that being moved induces feelings of warmth in the chest.

In addition, other positive states such as love are also associated with increases in perception of the warmth of one's own body (Fredrickson, 2013; Nummenmaa, Glerean, Hari & Hietanen, 2013). It would therefore be of interest to investigate whether a warm chest is uniquely prototypical for kama muta or might also occur in other affective states not tested in these two studies. However, it seems that positivity does not induce a warm chest per se. In Study 2 a more neutral state did induce higher ratings of a warm chest than the positive affect control condition, in this case amusement.

Results of Study 2 indicate that perceptions of external warmth are not greater after feeling moved, compared to feeling amused or neutral. We assessed perceptions of ambient temperature perceptions with the same procedure that other researchers have used (e.g. IJzerman & Semin, 2010; Zhou, Wildschut, Sedikides, Chen & Vingerhoets, 2012). However, studies including this item often report only marginal differences (e.g. IJzerman, Janssen & Coan, 2015; IJzerman & Semin, 2010) Especially regarding the focus of these research studies on the embodiment of warmth it is interesting that this process is assessed with external and not internal warmth ratings. External and internal ratings have been found to be uncorrelated in other studies as well as the present Study 2 (see IJzerman, Janssen & Coan, 2015). Communal sharing relations focus on bodily warmth and its transmission to other individuals, thus, emphasizing internal thermoregulation (IJzerman et al., 2015). It is therefore not surprising that kama muta does not affect external perceptions of temperature.

The present study investigated subjective temperature perceptions, but the question arises whether body temperature and especially chest temperature might actually objectively change in individuals when experiencing kama muta. On the one hand, temperature perceptions might only be subjective and caused by metaphorical grounded cognition (e.g. IJzerman & Semin, 2009). Not only the English vernacular term *heartwarming* is often utilized for denoting moving experiences, but this is true for semantically similar terms in other languages such as German, Norwegian or Urdu. The metaphorical perspective would also explain why most warmth is perceived in the chest, closely to the heart, and not in other body parts.

Research indicating that affective states influence actual body temperature changes has been of mixed results and scarce. Different evidence suggests that psychological stress

induces higher body core temperatures (Oka, Oka & Hori, 2001; Marazziti, Di Muro & Castrogiovanni, 1992), however, the picture is less clear for positive affect. One study reports increases in skin temperature after watching positive videos (Rimm-Kaufman & Kagan, 1996). In another attempt skin temperature was found to decrease after listening to 'intensely pleasurable' music in contrast to neutral music (Salimpoor, Benovoy, Longo, Cooperstock & Zatorre, 2009). A decrease of skin temperature after positive affect was also found in one study testing infants (Nakanish & Imai-Matsumura, 2008), whilst a different study reports no difference in skin temperature for intense positive emotional responses to music or videos (Rickard, 2004). All of these studies did not test for being moved explicitly though the possibility exists that some stimuli induced kama muta.

From a biological viewpoint the feeling of warmth in the chest would likely reflect body core temperature and not peripheral skin temperature at the extremities. Basic thermoregulation consists of two processes; *vasolidation or vasoconstriction* (IJzerman et al., 2015). Vasolidation refers to the process that allows blood to flow into the periphery and also increase skin temperatures while vasoconstriction describes the antagonist reaction by contracting blood vessels and limiting flow into the periphery in order to conserve core temperature. While vasolidation increases peripheral temperature and decreases core temperature this is mechanism is reversed for vasoconstriction (see Charkoudian, 2010 for an overview). Hence, an increase in chest temperature might be due to vasoconstriction although paradoxically kama muta has been associated with a decrease in arousal (Seibt et al., 2015). IJzerman and colleagues (2015) note that piloerection or goosebumps have been connected to vasoconstriction, especially because of their function to conserve body heat. Piloerection is in turn also reported to a high degree by individuals feeling moved or touched (e.g. Seibt et al., 2015; Benedek & Kaernbach, 2011; Strick, de Bruin, de Ruiter & Jonkers, 2015). Further research would need to test whether an actual temperature change does occur after feeling moved. Furthermore, the biological and evolutionary aspects of this merit careful consideration.

**The Causal Relations of Kama Muta**

The present studies provide some first evidence that being moved causes feelings of closeness and warmth in the chest. The first study did only reveal a correlational relationship between kama muta and closeness. Feeling closeness towards one's own mother did not differ after recalling a moving, amusing or neutral episode although an indirect effect for the manipulation was found mediated by kama muta. It should also be emphasized and noted that

even obtaining an effect of this manipulation in the first study would not have supported a causal relationship for being moved triggering communal feelings. Because of the main interest of testing 1st and 2nd person experiences in Study 1 the method instructed participants to recall a specific experience. Recalling this experience could have already led to feelings of closeness towards the target. On the other hand, Study 2 was interested in 3rd person experiences. In this study participants did not share a relation with the narrator of the audio recording before the study. In fact, individuals seem to be often moved by unknown individuals (see Seibt et al., 2015).

Feelings of chest warmth were also hypothesized to mediate the link between being moved and closeness. This proposition was partly supported in the second by a significant indirect effect. Including warmth in the chest as a possible mediator did weaken the relationship between being moved and closeness, but being moved remained closely related to closeness in a direct path. Hence, the link was only partially mediated by warm feelings in the chest. In addition, this also held true for closeness as the mediator on the link between being moved and warmth in the chest. The indirect mediation effect was not significantly smaller than the one for the other mediation. Based on the present results it is not possible to favor one causal process over the other one. Previous literature has supported both mechanisms and the present studies could not find evidence for favoring one of the two models either. In fact, some researchers argue that causality for a mediation process can only be inferred if a model reversing mediator and outcome variable does not provide a significant indirect effect (Hayes & Preacher, 2014). This was not the case in Study 2.

In the analyses performed, mediation was established with a *measurement-of-mediation* approach, which some researchers have argued is biased in several ways (Jacoby & Sassenberg, 2011; Bullock, Green & Ha, 2010; Spencer, Zanna & Fong, 2005). So future studies should fruitfully utilize experimental designs that manipulate the mediator variable. This could be implemented by not only allocating participants to different emotion induction conditions but also inducing different temperature perceptions in the chest by applying a warm or cold therapeutic pack or presenting individuals with communal or agentic traits. Further research needs to examine the possible mediation effect of warmth in the chest or closeness and utilize more statistically valid methods.

A different issue arises that was not specifically tested in the present studies, but is still debated in the emotion research literature. Do physiological reactions precede the affective experience or does the affective experience induce the physiological reaction? The present

research gives a first insight into a causal relationship of being moved and warmth, that being moved triggers feelings of warmth in the chest. Recent research has also tried to disentangle this problem by measuring both ratings of being moved and a warm chest independently by different samples continuously (Schubert et al., 2015b). Time courses for the relation of being moved and warmth were highly correlated with no evident lag in either direction evident at the temporal resolution of participants' responses and no rating did precede the other. One possibility to further test the causal relation would be to manipulate actual warmth in the chest region with a therapeutic pack and measure feelings of being moved. A comparison with a control condition or a group with a cold pack attached to the chest might give some more insight into the present issue.

**Possible cognitive mechanisms**

The question whether feelings of kama muta might induce communal sharing motivations for other uninvolved targets has been discussed before. In order to be able to make predictions and test these empirically the cognitive processes and mechanisms have to be explored. Discussion and testing of cognitive processes for the effects of being moved or the relation between closeness and warmth have been under-reported to date. There are a number of different theories of the processes through which affect influences cognitions and thereby produces judgments and behavior. One classic theory proposes that affect functions as a precursor for judgments and will be often treated as having informative value. This proposition has been therefore termed the *affect-as-information* hypothesis (Schwarz & Clore, 1983). In their now classical study, Schwarz and Clore argued that positive mood will result in positive judgments while negative mood will inform more negative judgments. However, this relationship is attenuated or resolved when attention is directed towards an irrelevant source for the affect. While positive affect due to sunny weather resulted in positive ratings of life satisfaction this association was decreased when individuals were reminded of the actual weather and thus the source of their affect. The proposition has been tested for several other affective states including fear and anger and has been utilized in different applied settings such as courtroom scenarios (Clore & Huntsinger, 2007). Although originally based on mood, the account has been translated to more object-related and temporally limited phenomena often defined as emotions. Thereby it is argued that judgments are based on the appraisal patterns of affective states that are utilized as informational value (Schwarz & Clore, 2007). Applied to the feeling of kama muta this would consist of a process through which the intensification of communal sharing sentiment is treated as having informational value and

thereby affecting behavior. Although the sudden intensification of communal sharing relations is not defined as an appraisal in the classical sense (Seibt et al., 2015) this affect-as-information approach would entail several interesting implications. First of all, this perspective would support Seibt et al's proposition that feelings of kama muta trigger the salience of CS relations and the tendency to build, engage and reinforce them. Moreover, when attention would be directed towards the affective appraisal pattern, in this case the CS relation judgment should not be affected by the affective feelings as proposed by the affect-as-information account. Future research would need to investigate such a mechanism.

Another perspective on the interplay of affect and cognition has been proposed by the *affect-infusion-model* (AIM, Forgas, 1995). This theory argues that in complicated situations that demand motivated or substantive processing, affect might influence and infuse information and thereby affect judgments due to the substantial cognitive processing style. Heuristic or direct access processing styles will on the other hand result in affective control, thus diminishing the influence of affect (Forgas & Vargas, 1998). The AIM model has been tested and validated over different situations and applied contexts (Forgas & George, 2001). In contrast to the affect-as-information hypothesis the AIM focuses on situational contexts and processing styles. Moreover, it has been argued that the affect-as-information model only comprises a heuristic processing strategy (Forgas, Ciarochi & Moylan, 2000). The AIM would make different predictions for differences in processing styles. However, it has not been tested which processing style is mostly associated with kama muta yet. Research would need to induce different processing styles and assess the effects on kama muta. In line with the AIM a substantive processing strategy would induce more communal feelings due to affect infusion in contrast to a more heuristic processing. Similarly a semantic processing view would argue that positive affect would not only induce substantive processing but also semantic associations (Kuhl, 2000). This view is also in line with the findings that positive affect results in more relational and global processing (Clore & Storbeck, 2006). Finally, as presented before Cova and Deonna (2014) suggest that appraising positive core values triggers a *reordering of importance* of these values. This view bears some resemblance to the semantic processing approach. In contrast to the affect-as-information hypothesis this it would indicate that not only affective states work as informative but that these informative values are evaluated in a second step. Whether this evaluation would include deliberate conscious processes would be subject to investigation. In sum, different theories on affect and cognition

support the present results, though from different perspectives. Future research would need to apply different means and test for different outcomes and their validity.

**Coda**

The effects of kama muta might not be limited to increased closeness and warmth perceptions. Feelings of closeness could translate into intentions or motivations to actually engage in communal sharing behavior such as helping altruistically or touching. In fact, research suggests that it might induce pro-social behavior (Cova et al., 2014, Schnall et al., 2010), or in the case of music, increase persuasiveness of advertisements (Strick, de Bruin, de Ruiter & Jonkers, 2015). These findings are in line with the general characteristics of communal sharing relations. Based on communal sharing kama muta might in turn also trigger increased imitation, food sharing or tendencies to touch other individuals (cf. Simão & Seibt, 2015). Future research would need to establish and test possible effects.

Watching moving videos on the Internet might not only lead people to feel closer to the characters in the clip, but also lead to motivations to share the videos with other friends or close significant others. These motivations could be grounded on the basis to induce communal feelings in other individuals. In the end, these media contents spread like a virus across social networks infecting its viewers with communal feelings and resulting in a perpetuating spiral. Based on relational models theory and the kama muta framework the present article provides initial insight into the effects of being moved. This affective state triggers feelings of communality along a feeling of warmth in the chest region. In short, kama muta induces *heartwarming closeness*.

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# Appendix

## Appendix A – Informed Consent Study 2

**Informed Consent**

**Background and purpose**

This is a request for you to participate in a research study that intends to measure emotions and feelings that arise while we consume media. We investigate video clips on Youtube or Facebook, audio clips in podcasts, stories in blogs and books, and other media. The goal is to better understand what makes us feel emotions, which emotions exists, and how they differ between cultures.
This research is conducted by a team at the University of Oslo. You can contact Thomas Schubert, thomas.schubert@psykologi.uio.no, for questions and comments.
**What does the study entail?**

During the study, you will be exposed to a brief audio clip. which will take about two minutes. We will then ask you about your thoughts and feelings about what you saw, heard or read. In addition, we will ask you a couple of questions about yourself.

If you get paid for participation in this study by Amazon MTurk, we ask you to listen to the audio clip, and to finish the questionnaires. You will not be paid if you do not proceed until the end of the questionnaire. You can however leave out questions that you do not wish to answer.

**Potential advantages and disadvantages**

The clip and texts that you are going to see are selected because they cause emotional reactions. We believe that you will enjoy listening to most of this material, and that the questions will be interesting for you to reflect on the experience. None of the stimuli features any graphic violence, disturbing scenes, or material of sexual nature.

**What will happen to the information about you?**

The samples and data that are registered about you will only be used in accordance with the purpose of the study as described above. All the data and samples will be processed without name, ID number or other directly recognisable type of information. It will not be possible to identify you in the results of the study when these are published.

**Voluntary participation** Participation in the study is voluntary. You can withdraw your consent to participate in the study at any time and without stating any particular reason. This will not have any consequences for your further treatment. If you wish to participate, indicate your consent below before proceeding. If you agree to participate at this time, you may later on withdraw your consent without your treatment being affected in any way. If you later on wish to withdraw your consent or have questions concerning the study, you may contact thomas.schubert@psykologi.uio.no.

**Privacy**

Information that is retained about you are only the answer you give in the questionnaire. No identifiable information, such as IP, is saved.

If you participate via MTurk, a temporary random code number links your participation here to the MTurk HIT. That number is deleted three days after your participation.

**Releasing material and data to other parties**

Your answers are merged with the answers of the other participants in a large database; your answers can not be traced back to you. This database might be shared with other researchers, which is recommended best practice in any psychological research.

**Right to access and right to delete your data and samples**

If you agree to participate in the study, you are entitled to have access to what information is registered about you. You are further entitled to correct any mistakes in the information we have registered. If you withdraw from the study, you are entitled to demand that the collected samples and data are deleted, unless the data have already been incorporated in analyses or used in scientific publications.

**Funding and the role of University of Oslo**

The study is funded by research grants from the Department of Psychology of the University of Oslo, Norway.

**Information about the outcome of the study**

You are entitled to receive information about the outcome/result of the study. Please contact the research team to do so.

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Appendix B – Questionnaire Study 1

| | |
|---|---|
| 1. Informed Consent | see Appendix A |
| 2. Intro | Thank you for participating in this study! During the study you will be asked to provide a short description of a situation or instance in your life or in the life of a family member. Please read the instructions and think about the situation carefully. Afterwards we will ask you some questions about feelings associated with the situation. Finally, there are some questions about your personality. The survey will take about 20 minutes to finish. NOTE that you can only participate of both your parents are still alive. If this is not the case please close this survey and return the hit. |
| 3. Names | Please provide the name of a close friend or a distant acquaintance. In order to ensure anonymity only provide first names or initials.<br><br>close friend: xxxxx<br>distant acquaintance: xxxxx |
| 4.1 Instructions Kama Muta Condition | Sometimes when people listen to certain music or watch certain films they experience a positive feeling that, when it is intense may be accompanied by tears, chills or goosebumps. This feelings is often referred to as 'being moved' or 'being touched'. Please think back to a situation or instance where you experienced this particular feeling (touched or moved) with your mother.<br><br>Recall the situation and summarize it briefly below.<br><br>(Some people who grew up with their grandmother or another caretaker might call this person their mother. If that applies to you please write about an experience with this particular person.)<br>Please write complete sentences and at least 200 characters. |
| 4.2 Instructions Amusement Condition | Please think back about an instance or situation in which you experienced amusement, laughter or a funny situation with your mother.<br><br>Please write down a short abstract of this situation or instance below.<br><br>(Some people who grew up with their grandmother or another caretaker might call this person their mother. If that applies to you please write about an experience with this particular person.)<br>Please write complete sentences and at least 200 characters. |
| 4.3 Instructions Neutral Condition | Please think about a regular work day in the life of your mother.<br><br>Write a short summary about it below.<br><br>Some people who grew up with their grandmother or another caretaker might call this person their mother. If that applies to you please write about an experience with this particular person.)<br>Please write complete sentences and at least 200 characters. |
| 5. Emotion Ratings | What emotional reactions did thinking about and writing down the situation elicit in you? How did recalling this situation make you feel? |

| | not at all | | | moderately | | | very much |
|---|---|---|---|---|---|---|---|
| moved | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| touched | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| amused | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| sad | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| happy | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| uplifted | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

## 6. Physiological Ratings

What physical reactions did you experience while thinking about and writing down the situation?

| | not at all | | moderately | | very much |
|---|---|---|---|---|---|
| tears | ❍ | ❍ | ❍ | ❍ | ❍ |
| warm chest | ❍ | ❍ | ❍ | ❍ | ❍ |
| chills/goosebumps | ❍ | ❍ | ❍ | ❍ | ❍ |
| choking feeling of constriction in throat | ❍ | ❍ | ❍ | ❍ | ❍ |
| I smiled | ❍ | ❍ | ❍ | ❍ | ❍ |
| I sighed or made a sound like 'Ahh' | ❍ | ❍ | ❍ | ❍ | ❍ |
| moist eyes | ❍ | ❍ | ❍ | ❍ | ❍ |

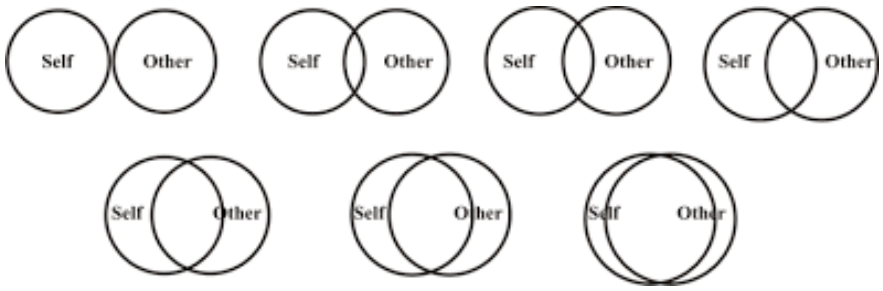
## 7. Communal Strength

Please answer the following questions with regard to your mother/father.

| | nothing at all | | | | | | | | | extremely |
|---|---|---|---|---|---|---|---|---|---|---|
| How far would you be willing to go to visit your mother? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| How happy would you feel when doing something that helps your mother? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| How large a benefit would you be likely to give your mother? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| How large a cost would you incur to meet a need of your mother? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| How readily can you put the needs of your mother out of your mind? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| How high a priority for you is meeting | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

8. IOS Scale

Which circle formation represents your relationship with your mother best?



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| 9. CS Motivation |  |

| | not at all | | | moderately | | | very much |
|---|---|---|---|---|---|---|---|
| How much would you like to give your mother a hug? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| How much do you want to call your mother right now? | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

If you were to win $10,000 that you can use for whatever you want, how much of it would you give to your mother?

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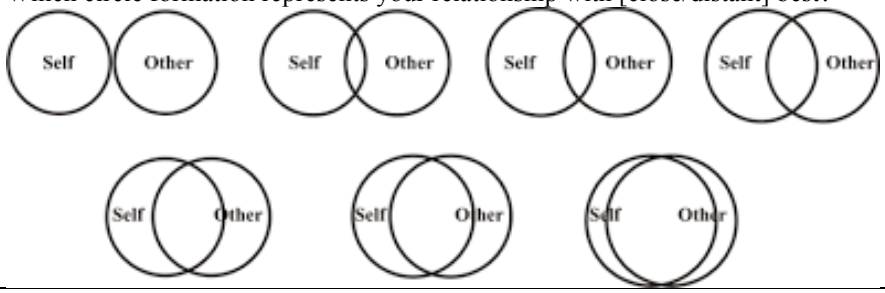
| 10. Communal Strength, IOS Scale & CS Motivation repeated for father | |
| 11. IOS Scale close/distant | Which circle formation represents your relationship with [close/distant] best?   |
| 12. Empathy, Attachment scale; Demographics; Debriefing | |

## Appendix C – Narratives Study 2

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| Kama Muta | My name is Laura and I own a small coffee shop that is located in a busy urban area. I inherited the café from my father some years ago when he father retired. The small store had been run by the family for ages and is popular with locals, although coffee chains have begun to open in the neighborhood.<br><br>However, my café is substantially different from its competitors. Everyday you can see a lot of homeless people from the street hanging out in my café and sitting next to other customers. They are sipping on their coffees and tasting the freshly baked varieties of cake. They mingle with the better-dressed customers, who take their presence for granted. I feel that every human being deserves the right to drink good coffee and eat delicious pastries, so I started to give away free coffee and pastries to my customers who can't afford to pay for them. This reduces my personal profits, of course, but seeing these people enjoying their coffee and smiling and being happy is a greater gift than money |

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| | could ever give me. I'm really grateful that these folks can forget their tough situations for a few minutes. And none of them exploit my policy by drinking too much coffee or eating too many pastries. My generosity is well known to my other customers and neighbors, and people often tell me that they admire me for what I do.<br><br>One day while I was unpacking a new coffee delivery a woman entered the café. She was wearing old and worn-out clothes and her face looked tired and aged. She greets me and I recognized her and started to make her the latte that she likes, but she declined. She suddenly reached out for my hand and said that she has found a job and can afford an apartment now, after 15 years living on the street. She told me that my kind generosity is what kept her alive and enabled her to go on. Then she added that she wants to give something back and tells me that she wants to work for me on weekends for free so that I can continue giving free coffee to the poor. Tears slowly started to run down my face and then she gave me a long and profound hug while the other café customers began cheering and applauding. |
| Neutral | My name is Laura and I own a small coffee shop that is located in a busy urban area. I inherited the café from my father some years ago when he father retired. The small store had been run by the family for ages and is popular with locals, although coffee chains have begun to open in the neighborhood.<br><br>The café features different coffee sorts from all over the world. Columbian, Brazilian and also Ethiopian coffee specialties are part of the menu. These blends are especially rich in flavor and quite popular among the regular costumers. Next to these I also sell other standard coffee drinks and different sorts of tea. The menu also features a huge selection of freshly baked pastries that change daily. My cheesecake is known in the area but my strawberry-lime tarts are popular as well.<br><br>The interior of the café features old furniture that I collected during my travels around the globe. I am especially proud of a selection of chairs that were hand crafted for me by locals in Azerbaijan. Next to the flowery decoration the café features several board games that the costumers like to use and play.<br>The café is directly situated at the corner near a busy cross-walk. The exterior is painted in white and blue colors and a big sign reads 'coffee bar'. The sign has been hanging there for several years and has become rusty and gray.<br><br>Now and then the café unknown local bands or singer songwriters perform at the café. The café is then especially filled with curious guests and non-local costumers.<br>I do like what I do. It is lot of hard work to run the café but I have a well-functioning team and satisfied customers. |
| Amusement | My name is Laura and I own a small coffee shop that is located in a busy urban area. I inherited the café from my father some years ago when he father retired. The small store had been run by the family for ages and is popular with locals, although coffee chains have begun to open in the neighborhood.<br><br>I like the different types of people stopping by at my café and I have become quite fond of a few regular customers. Every Wednesday at 3:00 a group of four old ladies comes to the café. They always sit at the same table, occupying the same seats, ordering the same types of cakes and beverages. They have been living in the neighborhood for many years and it seems that this is the only thing they have in common. From what I can overhear from the conversations they mostly talk about how irritating their neighbors are.<br><br>One Wednesday afternoon something unusual happened. As the ladies arrived in the café, exactly at 3:00, all the tables were taken. The four of them remained standing in the entrance, dumbfounded, and didn't know what to do. After an awkward silence, one of them, a voluptuous woman with almost purple hair and a tiny handbag, approached me behind the counter. "Excuse me", she said, "our table is taken! Where are we supposed to |

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| | sit?". I smiled calmly and explained that I was not able to reserve tables, but that I could arrange for them to sit at the counter on the four barstools available. The ladies were appalled by this suggestion and accused me of bad customer service. The café had become quiet as the ladies were causing quite a scene. I apologized for the inconvenience but added that, at this point, there really wasn't much else he could do. The voluptuous lady stormed towards the exit, not noticing small pug dog sleeping next to the table of a young couple situated close to the door. When the huge old lady stepped on the pug, the dog jumped up in the air and barked like crazy. The shocked old lady stumbled backwards and landed with her behind on another table where two men in business suits where just about to eat their lemon pies. In silence, the group of ladies quickly left my café, one of them taking the two slices of lemon pie 'to go'. |